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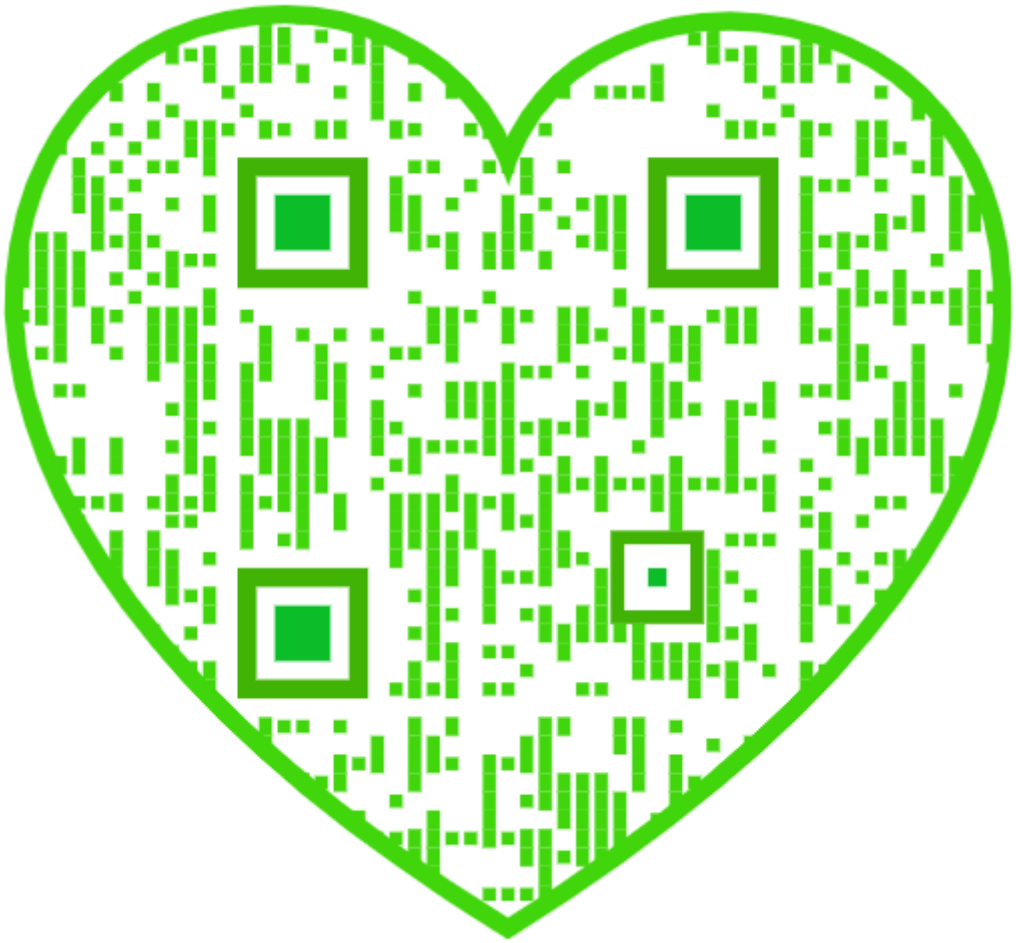

The bee-keeper's text-book

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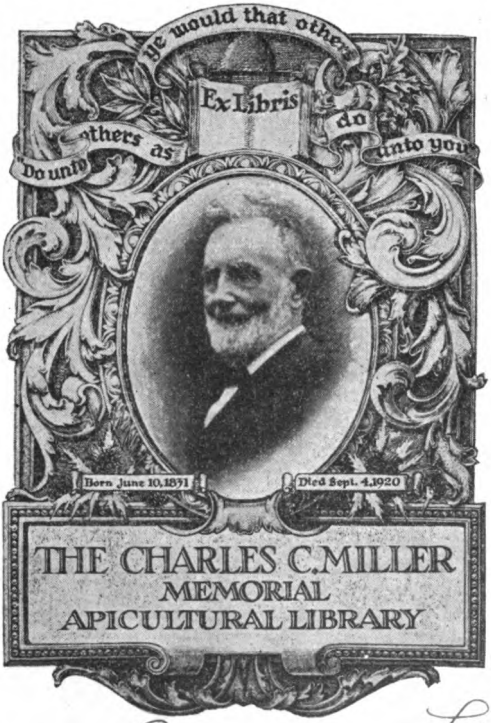

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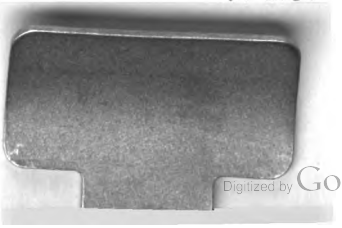
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ON ALL PRACTICAL SUBJECTS CONNECTED WITH THE CULTURE OF THE HONEY BEE IN BOTH COMMON AND MOVABLE-COMB HIVES,

GIVING MINUTE DIRECTIONS FOR THE

MANAGEMENT OF BEES IN EVERY MONTH OF THE YEAR,

AND ILLUSTRATING THE

NUCLEUS SYSTEM OF SWARMING AND ITALIAN QUEEN REARING.

BY N. H. & H. A. KING,

AUTHORS OF "HINTS TO BEE-KEEPERS."

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PREFACE.

THE successful cultivation of the honey bee, depends upon a correct knowledge of the laws by which the economy of the hive is regulated; comply with these laws and you reap a golden harvest—disregard them and disappointment and loss are the certain result.

The following pages are designed to impart:

1st. A knowledge of these laws.

2d. Instruction how to comply with their requirements.

3d. Caution against their violation.

To accomplish these ends we have endeavored:

1st. To bring the language within the comprehension of the man of limited education and means, to whom bee-keeping commends itself on account of its large pecuniary returns for the capital and attention required.

2d. To present the practical part of the subject fully and yet briefly, believing, as we do, that condensation, to the greatest possible extent consistent with a full exposition of the subject, not only diminishes the cost but increases the value of a work of this kind.

3d. To convey the most valuable knowledge, we have drawn from every available source, not having been ambitious to write a work purely original. Yet, as theories are worthless unless

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founded in truth, we have only accepted facts which have been demonstrated by eminent apiarians, and confirmed by many years' experience of our own, devoted almost exclusively to bee culture.

In our investigations in apiarian science, we have received material aid from the writings of Huber, Bevan, Dzierzon, Quinby, Harbison, Langstroth, Miner, Metcalf, Wagner, and many others, both ancient and modern.

Although the demand which called this work into existence was created by the favor with which the bee-keeping public received the American side-opening hive, yet we have endeavored to adapt the instruction to the use of both common and movable-comb hives.

H. A. KING.

September, 1866.

PREFACE TO THIS EDITION.

The size, cost and character of this work has already procured for it a large sale. It has now been re-written and thoroughly revised, embracing the latest discoveries and improvements in bee-keeping, which we trust will elicit for it, if possible, still higher commendation. Having electrotype copies of its pages, we are enabled to furnish books by the quantity to our patrons and the trade, at lower rates than heretofore.

THE AUTHORS.

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INTRODUCTION.

BEE-KEEPING.

THE culture of the honey bee has engaged the attention of intelligent and enterprising men of all ages; yet within a few years, by the introduction of improved movable frames and other improvements, this pursuit, always attractive, is rendered no longer a business of "luck" or chance, but as certain and more remunerative, with small capital, than any other rural occupation.

About five years ago, it was estimated, in the "American Bee Journal," that there were then seventy thousand bee-keepers in the United States, many attending to several apiaries, with from one hundred to three hundred swarms in each, and yet, with the increasing light and interest, hundreds, all over the country, are engaging in this branch of industry. In the mind of the uninformed but enquiring reader, a few questions will arise, which we will here only briefly notice, as he can refer, from the index, to each subject—more fully treated under its appropriate head.

Is there not danger of overstocking the country?

Says M. Quinby, one of the most extensive bee-keepers in the world, "this interest in bees should be encouraged to continue till enough are kept to collect all the honey now wasted, which, compared with the present collections, would be more than a thousand pounds to one."

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Do not some fail of success in bee-keeping?

Yes, just as the farmer fails who neglects his fences, plows his lands when too wet, or crops them until their fertility is exhausted. So in bee-keeping. Some fail through gross neglect, or allow their bees to become so weakened by overswarming as to fall an easy prey to the moth; while others "divide" till they are left without "quotient" or "remainder." Let us profit by their experience, and prosperity will be the result.

Is not watching for swarms, hiving, &c., perplexing in large apiaries?

Yes: and you will find a complete remedy in the chapter on "Nucleus Swarming," which enables you to swarm many stocks at one time, securing to each new swarm a fertile queen, without removing the old queen from the parent stock or scarcely interrupting its labors. By this method, you will obtain a steady increase of stocks, avoid queenless swarms by loss of young queens; thus, all colonies *are kept strong*, enabling them to bid defiance to the moth-miller and other enemies. This, in the words of an eminently practical bee-keeper, "is both sure and economical;" doing away with all watching and loss by flight to the woods.

Is it true that there are only a few who understand the secret of handling or "charming" bees?

That there are a few who claim to have some great secret, and convince gaping crowds by performing tricks and wonderful [?] feats with bees, (not forgetting to pocket the proceeds of the supposed secret,) we readily admit. Yet, it is also true that there are hundreds of successful bee-keepers in the United States,

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who esteem the good of the cause and their reputation, of more value than money thus obtained from the uninformed, and freely communicate instruction how to safely perform all needful operations. One of them says, "acquaint yourself with the *principles of management*, * * and you will find that you have little more reason to dread the sting of a bee than the horns of a favorite cow, or the heels of your faithful horse."

WHO SHOULD KEEP BEES?

We reply, all classes who want a healthy, pleasant and profitable occupation.

Says Rev. Robert Baird, "there are few portions of our country which are not admirably adapted to the culture of the honey bee. The wealth of the nation might be increased by millions of dollars, if every family favorably situated, would keep a few hives. No other branch of industry can be named, in which there need be so little loss on the material employed, or which so completely derives its profits from the vast and exhaustless domains of nature."

The Farmer should keep Bees to collect the honey afforded by his orchards, timber lands and broad pasture fields; for "profit must attend success in this branch of the farmer's stock, inasmuch as bees work for nothing and find themselves."

The Mechanic should keep Bees, as those who work in wood can make their own hives, beside supplying their neighbors; and all will find that, for the little time and capital required, it will materially affect their expenses and income.

The Horticulturist should keep Bees to gather the delicious

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nectar which "would else be lost on desert air," and also to mingle the pollen of flowers, for

> Trees will flourish all the more,
> When flowers mate by rifled store.

The Invalid, by spending a portion of his time in the open air, caring for his bees, will not only find his purse replenished, but, what is better, returning health.

> He who with health would live at ease,
> Should cultivate both fruit and bees;
> Much labor though the first demands,
> The second 's for more feeble hands.

The Merchant and Professional Man, and all who spend much of their time *indoors*, will find in bee-keeping a pleasant, healthful outdoor pastime, invigorating to both mind and body.

Those who own no land may keep Bees. In raising horses or cattle, one must own or hire his pasture lands. They are very serviceable, but they *must be fed.* Bees require but little room, and find their own food; for "roam where they will, the whole region is their common."

The Aged, and in short, *every person*, who wishes to engage in a light occupation, which will secure health, ease and independence, should give this subject an earnest and candid examination

Bees multiply rapidly, and one who has ten stocks, may, with care, soon expect to have a hundred, and a moderate increase need not interfere with a large annual harvest of honey.

To the wants of what class of mankind has not the Creator admirably adapted the industry of this insect, and how eloquently this adaptation speaks of his goodness, wisdom and care for the welfare of his creatures?

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CHAPTER I.

PHYSIOLOGY OF THE THREE CLASSES.

A PROSPEROUS colony of bees, at the beginning of the "swarming season," consists of a fertile queen, a few hundred drones and about forty thousand workers. The annexed cuts will give a fair representation of the three classes into which this insect community is divided.

Queen.

Drone.

Worker.

THE QUEEN is a perfectly developed female, and the prolific parent of the whole colony—the mother of every bee it contains. "Mother Bee" is her most appropriate and truthful name, as laying eggs appears to be the sole end of her existence, and the only duty she performs. This fact is beautifully demonstrated by removing a native queen and introducing an Italian queen in her stead. If the change is made in November, few common bees will remain by the following May; or if made in June, the yellow workers will begin to appear in a few weeks,

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and by September scarcely a black bee can be found in the hive. In the height of honey gathering, and under the most favorable circumstances the queen will deposit about three thousand eggs per day. She is distinguished from the other bees by her form, color and size, being longer and darker colored upon the back than either drone or worker. But the Italian queen is much lighter colored than either the Italian drone or worker, the larger part of her body being of a golden yellow.

The queen is of slender structure, with comparatively short wings, and is usually recognized by her measured matronly movements and her long, finely tapered abdomen.

She usually lives from three to four years. If her death occur when there are drones in the apiary and young worker brood or eggs in the hive, or if she is soon to leave the hive with a first swarm, the workers construct large cells, supplying them with "royal jelly," and the eggs or larvæ that would otherwise have produced worker bees are developed into queens. Only one queen is allowed to remain in the hive. The queen has a curved sting, but will use it only when contending with rival queens, as she cannot tolerate a rival within the hive. Eggs are sometimes laid by the young queen before her impregnation, but they invariably produce drones. She usually leaves the hive when about five days old to meet the drones in the air for impregnation, which—once accomplished—suffices for life, as ordinarily she never afterwards leaves the hive except when accompanying a first swarm. The drone semen or sperm is retained in the spermatheca of the queen, a small sac near the point of her abdomen, and when laying, as the egg passes from the

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queen's ovary, it is brought in contact with the drone sperm to produce workers, or is allowed to pass without such contact to produce drones, the same as eggs laid before her impregnation. Some have supposed this contact to be produced by compression of the queen's abdomen, caused by the size of the cells in which workers are reared, they being much smaller than drone cells. This theory is disproved by the fact that a stock deprived of its drone-comb, will sometimes rear drones in worker cells; besides, in comb-building, the queen will frequently deposit eggs in the cells while their walls are scarcely an eighth of an inch long and could cause no pressure.

THE DRONE.

"*The drones are the males, and do not work for the support of the hive, but lead an idle life, feeding upon the produce of others' labor.*"—RICHARDSON.

The drones are more bulky, though somewhat shorter, than the queen, and, unlike her, their wings are long enough to cover the entire abdomen. They are much larger than the workers, and have a clumsy, uncouth appearance. When flying, their loud, boisterous hum is easily recognized. Being without a sac for carrying honey or grooves on their thighs for pollen, they are physically disqualified for performing any labors of the hive. Their proboscis is too short for extracting the nectar from flowers, and being destitute of a sting, they cannot assist in protecting the stores from robbery. They are called into existence at the approach of the swarming season to fertilize the young queens. As impregnation is effected while on the wing, the

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drones leave the hive in considerable numbers about noon, on fine days, and the young queens make their excursions soon after. Whenever this service is supposed to be accomplished for the season, they are relentlessly driven forth and destroyed by the workers. A stock of bees that has lost its queen and failed to rear another, will retain drones after all others are destroyed, and frequently throughout the winter. Without drones the young queens would remain barren, and the race soon become extinct. The number of drones in a hive is often very large, amounting to hundreds and even thousands. In a state of nature, or where but one or two hives are kept, a greater proportion of drones are necessary as the young queen, when making her "bridal trip," should be sure of a speedy meeting, for, when roaming long in search of one, she is more liable to accidents. Where several colonies are kept, if each rear a few dozen drones there will be enough, in the aggregate, for all practical purposes. In movable comb hives all excess of drone comb should be removed, and the production of useless consumers thus prevented.

THE WORKER.

The workers, although the most diminutive in size of the three classes, are alike the wonder and admiration of the student of nature.

When we consider their *unvarying* God implanted instincts, whether displayed in hoarding rich stores for future use, in their matchless architectural skill, as seen in comb-building, or in their entire devotion to the welfare of the queen and her numerous,

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maturing progeny, we are constrained to regard them as the most wonderful class of this insect family. The average age of the worker is but a few weeks during summer, and from six to nine months during the cooler part of the year.

As regards the sex of the workers, modern writers agree in classing them as undeveloped females. They are incapable of fertilization by the drone, yet, occasionally in queenless colonies, one will be found laying eggs, which, being unfertilized, never produce workers but drones only.

This laying need not be mistaken as the work of a fertile queen, for, unlike her uniform laying, these eggs are deposited regardless of order, some cells containing several and others none. The bees destroy the excess, and the remaining eggs produce perfect drones.

The workers are so well known that a minute description would seem superfluous in a Hand Book. Upon them devolves all the labor of collecting and defending the stores, building comb, feeding and protecting the queen and brood, and expelling the drones when they are no longer necessary to the well-being of the colony. In short, they rule and regulate the whole economy of the hive, performing all its offices except those which have direct reference to the reproduction of the species.

BREEDING.

The yield of honey strength of the colony, the season of the year, and other circumstances have considerable influence, both on the amount of brood reared and the time required for its development. In this latitude, the average time from the laying of

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the egg to the appearance of the perfect insect, is, for the worker, twenty-one days; for the drone, twenty-four; and for the queen, about sixteen days. The cells, in which the workers are reared, are the smallest in size, those for drones nearly one-third larger, and a queen cell still larger and of peculiar form, requiring as much material for its construction as fifty worker cells. In strong colonies, having plenty of stores, the queen will often deposit eggs in every month of the year, the least brood being reared between October and January. During this time the brood often occupies a small circle in the centre of the cluster of bees exactly opposite on each side of a comb. Smaller circles are next occupied in the two adjoining combs. The circle of eggs in the first comb is then enlarged, and more added in the others, continuing to spread to other combs, keeping the distance from the centre or place of beginning to the outside of the circle about equal on all sides. The effect of this is to produce a concentration and economy of the animal heat for developing the various changes of the brood. On the approach of spring, an increased amount of brood is reared, and as early spring flowers appear the bees go to work in earnest, to provide limpid honey and freshly gathered pollen for the queen and her numerous offspring. When the fruit trees unfold their pink and snowy blossoms, rich supplies are garnered by the busy throng of workers. Breeding goes on apace. The latent swarming impulse begins to be felt, and if the weather continues warm and balmy, we soon arrive at the swarming season.

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CHAPTER II.

NATURAL SWARMING.

THE swarming season is one of unusual interest to the bee-keeper. He hopes soon to commence his annual harvest both of swarms and surplus honey. The issue of natural swarms is almost wholly dependent upon continued warm growing weather. June is the great swarming month in the northern States. Yet, when the spring is unusually favorable, we get an occasional swarm as early as the middle of May, and many about the last of that month. Again, swarming may not commence until July. Bees will often rear drones, construct queen cells, and be just on the point of swarming, when a few days of bad weather will cause the drones and embryo queens to be destroyed, and swarming to be postponed indefinitely. As much time must be spent in preparation when this occurs, it will require several weeks before swarms can issue, though the weather be never so favorable.

Bees, like some human beings, seem most discontented when most prosperous. If the season is favorable, the May flowers will scarcely have appeared till the swarming fever begins instinctively to steal over the colony, affecting equally, perhaps, both queen and workers. The first step of preparation taken is the rearing of drones, by an early deposit of eggs in the drone cells by the queen. As these mature and the "lusty fellows"

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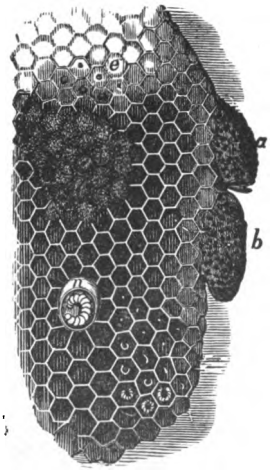
throng the entrance, if the weather is warm and pasturage abundant, a few queen cells will be commenced at different times by the workers. These, in most cases, are suspended from the edges or inequalities of the combs, with their open end downward. From three to ten queen cells are commonly constructed, and the egg or larvæ, is lavishly supplied with "royal jelly," a pungent, stimulating, light cream-colored substance, when the cell is further lengthened down and sealed over. It is now about an inch long, and resembles a pea-nut in shape and appearance.. In movable comb hives, these queen cells are easily found by looking over the combs about the time swarms are expected. You can hardly mistake them, even though you never saw one before. To find them in the common hive or gum, blow a few whiffs of smoke under the hive from a roll of burning cotton rags, tip it back and give them more smoke. Now raise the hive carefully from the stand, and turn it bottom up upon the ground without jar, being careful to turn it edgewise with the combs to prevent their breaking. Keep the bees down out of your way with the smoke, and let the light penetrate between the combs. If your hive is not very deep, some of the cells can usually be seen when they exist.



4. This cut represents brood in various stages from eggs and larvæ in the lower part of the comb to brood capped at *c*, and just emerging at *f*.; *n*, is a queen cell just commenced from larvæ; *b*, a perfect queen-cell capped over; *a*, a cell from which the queen has just emerged.

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The progress of these cells is the only certain indication of swarming, and when one or more have been capped over, the swarm is ready to leave for its new and sometimes distant home. The first warm, clear day is generally improved, when the mass of workers, after hastily filling their sacs with provisions for their journey, rush "pell mell" from the hive, accompanied by the queen, with great "noise and confusion."

After flying a short time, they usually cluster upon some overhanging branch, more or less elevated. Hives should be kept in readiness, as success depends greatly upon promptness in hiving swarms as they issue, for, if left hanging in the heat of the sun, they soon become impatient and often fly off and are lost in consequence.

HIVING BEES.

The process of hiving is extremely simple and pretty generally understood; if the new hive is *cool* and *clean* the bees are not slow in taking possession. If the swarm has clustered upon a bush or tree near the ground, spread down a sheet or piece of canvas directly under or as near the swarm as practicable. If the common hive is used, place a board about two feet square upon the end of the sheet, and upon that your hive. Let the hive be raised about an inch from the board, with blocks or strips of wood. If convenient, the hive may now be lifted and the swarm jarred directly into it and then carefully replaced upon the board, or the bees may be shaken upon the sheet in front of the hive. Some will soon discover the new home, and by their joyful hum communicate the glad tidings to the whole swarm. Hav-

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ing filled themselves with honey before leaving the old hive, they are usually peaceable and almost as harmless as flies. If they should clog the entrance, disturb them gently with the feather end of a quill, and, if any cluster upon the outside, brush them down and see that all enter lest the queen be left out. Now, let the hive down upon the board, and immediately carry it to the place it is intended to occupy in the apiary. Raise the front edge half an inch, and *shade the hive from the sun.* The few bees left flying will soon return to the old stock from which the swarm issued. But if the swarm is left where it was hived till evening, many bees will have commenced gathering honey, and, having carefully marked their new location, will, as they fly out, the next morning return to this place and perish. If a swarm should cluster upon a high limb or body of a tree, ascend upon a ladder and shake or brush them into a basket, and cover it over with a cloth to prevent their flying. The basket may be lowered with a cord to an assistant, or brought down, and gently poured upon the sheet at the entrance of the hive. When the swarm has clustered upon a small limb, it may be carefully severed without disturbing the cluster, and carried to the hive. Hold them to the entrance until some discover the hive, when all will gladly enter.

If a swarm cluster in some inaccessible place, as the forks of a tree, they may often be induced to enter a box inverted above them, by smoking or slightly sprinkling them with water, or by partly covering the box to make it resemble the entrance to a hive, brush a few in and they will soon call in the whole swarm. To hive a swarm in the movable-comb hive, remove the small

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slide and entrance block, when, if the hive stands flat on the sheet to prevent bees from getting under the bottom board, they will readily enter. It is sometimes convenient to remove the movable side and shake the swarm directly into the hive. Most of those flying about will soon join their companions at the common entrance. Now, close in the bees and carry the hive to its permanent stand. Let the bees have the full width of the entrance, by removing the small slide. In this way, hiving is quickly accomplished; and dispatch in hiving is important, as in very large apiaries, if natural swarming is permitted, much difficulty is often experienced from two or more swarms issuing about the same time, when, unless prevented, they are almost certain to unite. It is some trouble to separate them and have a queen for each. Therefore, when many swarms are expected, the apiary should be closely watched.

TO GUARD AGAINST SWARMS CLUSTERING TOGETHER.

At times, the swarming fever seems to be contagious. One swarm will scarcely have settled till another stock, and another, will send forth their crazy legions to darken the air and make "confusion worse confounded." The watchful bee-keeper will judge from the state of the weather and the condition of his stocks, when these things are likely to happen. While a swarm is issuing, if other colonies "hang out" threateningly, he should immediately sprinkle these outsiders with water, or blow a few whiffs of smoke into each hive. This will slightly disconcert them, and probably give time for hiving the swarm already out. If, however, one should start when the first is but partially

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hived, let him quickly cover it with a sheet to prevent a union, and give his attention to the new comers. These must now be hived; and when mostly in, if no others have started, uncover the first, that the stragglers flying may be divided between the two. But, should the second swarm start before the first has settled, he will hardly prevent their clustering together. After a swarm has started it is impossible to check it, without closing the entrance, which would be a dangerous and often fatal experiment. Beside, the queen may have been among the first to start, and she would be a serious loss.

When two swarms unite, if the bee-keeper's time is precious and his hive large enough, he may hive them together. When put in the movable comb hive, give such double swarms access to the surplus boxes immediately. They will usually store about one-third more surplus honey than a single swarm, but they will be worth no more at the end of the season, than each would have been had they remained separate. Hence, if the swarms are early and large, and the weather continues favorable, it is better to divide the swarm at the end of a week. (See "Nucleus Swarming.") However, if a movable-comb hive is not at hand, it will pay to take some trouble

TO SEPARATE SWARMS THAT CLUSTER TOGETHER.

In separating two swarms that have clustered together, the object is to get a queen for each. To do this, spread down a sheet, placing an empty hive upon each end. Shake your bees upon the sheet between the hives and sprinkle them with a little water, which will retard their movements and give a good chance

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to see the queens as they pass along. With a quill or brush, start the bees each way, having two or three feet for them to travel to reach each hive. Keep the bees moving and the entrances open. Watch for the queen near one entrance, while an assistant watches at the other hive. Both queens are often seen as they crawl over the sheet. If both are found, divide the bees equally, giving a queen to each hive, and the work is done. Should you find but one, secure her in a tumbler. Divide the bees about equally, and, by watching them a few minutes, you will soon see where your queen is needed, as those without a queen will show the usual symptoms, by running about the entrance and up the outside of the hive as if in search of some thing. Present the queen to them and they will soon become quiet. But, should neither queen be seen, you stand one chance in two of getting a queen in each hive. Watch them fifteen or twenty minutes. If one show signs of being queenless, if in a common hive, set it upon a thin sheet, and tie the corners over the top to prevent the bees escaping. Lay the hive down upon its side lest the bees smother for want of air. Now, shake the part that has the queens again upon the sheet, making them travel some distance to reach the hive. You will seldom fail to see one of the queens. When one is found, secure her in a tumbler, and when the bees are all in carry the hive to its stand. Set up the other hive, untie the sheet and place the queen at the entrance, when the bees will joyfully receive her. This hive should be placed some distance from the other on a separate stand.

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TO PREVENT NEW SWARMS FROM LEAVING THEIR HIVES.

Natural swarms will occasionally refuse to stay after having been hived, usually in consequence of heat or strong odors about the hive. In nucleus swarming this seldom or never happens, because the bees are never without a comb containing brood and honey; and this they will not leave voluntarily. Therefore, when hiving a swarm in a movable-comb hive, go to any stock that can spare a comb containing brood and honey. Brush back the bees, being careful not to remove the queen or any queen-cells with the comb, and place it in the hive that is to receive the new swarm. It will not only prevent the bees from decamping but will greatly encourage them, and should bad weather confine them to the hive they will be secure from starvation. If the swarm is put in a common hive, place over them a box of honey, taken from the parent stock.

HATCHING AND FERTILIZATION OF QUEENS

Queen cells destroyed.

In about eight days after the old queen leaves with the first swarm, the most advanced sealed queen is ready to emerge. During this time the old stock is without a hatched queen. The young queen immediately upon leaving her cell, if not restrained by the workers, commences the work of destruction upon her yet imprisoned sisters. She accomplishes this by biting open the side of each cell near its base, and dispatching the unfortunate inmate with her sting. She is yet incompetent for the maternal duty, and must leave the hive to meet the drones in the air for

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the purpose of fertilization. This once accomplished, the workers, awaiting her safe return, greet her with a reverence and affection never shown before. They hasten to prepare the cells to receive her tiny eggs, and seem to realize that on her the existence and perpetuation of the family depends. There is also a perceptible change in the queen's form, her abdomen being a little swollen and somewhat lengthened, but not as much as at the height of the breeding season. She now remains the fruitful mother of the prosperous and happy colony.

Fertile Queen.

Unimpregnated Queen.

SECOND AND THIRD OR AFTER SWARMS.

After the first swarm leaves the hive, if bees are still numerous and the yield of honey continues good, the workers will often decide to protect the queen cells, and thus cause the issue of one or more after-swarms. Small knots of bees cluster about the cells, and thus prevent their destruction by the first emerging queen. At this she seems greatly enraged and utters a peculiar sound, like the "peep," "peep," of young chickens, though on a very fine key. This is often answered in a hoarser note, from the eldest of the still enclosed queens. The senior queen continues "piping," as it is called for a day or two, meanwhile making every effort to engage in "mortal combat" her royal rivals. Being frustrated in every attempt, she finally leaves the hive in a "huff," accompanied by a considerable body of workers. It

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appears from this that the *immediate* cause of after-swarming springs from a desire to avoid a quarrel among the "women folks." The piping cannot be mistaken for any other sound given by the bees, and may always be heard the morning or evening preceding the issue of any swarm after the first. If a second swarm is to issue, piping will usually be heard, by hold ing the ear close to the hive, on the morning or evening of the eighth or ninth day from the departure of the first swarm; and, for third swarms, on the next evening or morning after the issue of the second. If it is not heard by the fourteenth day, from the time the first swarm left, no after-swarm need be expected. In good seasons or in favored localities, second swarms, if early, will generally lay up sufficient stores for winter, and are valuable on account of having vigorous young queens. But, in this latitude, if after-swarms are cast the old stock is often greatly weakened, and consequently more exposed to the inroads of the moth, besides seldom storing surplus honey after swarming. The swarms also often fail to secure stores for winter, and have to be broken up in the fall. A safer and more profitable course is to allow but one swarm to issue from a stock the same season. With movable-comb hives, the issue of after-swarms is easily and surely prevented, by opening the hive in five or six days after the first swarm leaves and taking away all the queen cells but one. By this course, we may keep all our stocks, both old and new, strong and prosperous. But with the common hive, probably the best that can be done is to join two or more second swarms together, (see "Uniting Bees,") as they are usually but half the size of first swarms. All swarms after the second should,

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after taking away their queens, be returned to the stocks whence they issued.

As third swarms are usually attended by several queens, it saves trouble to hive the swarm and let it stand by the old stock until the next morning, when all but one of the queens will be killed and the remaining queen may be found by jarring the bees on a sheet.

When after-swarms are expected, the apiary must be closely watched. First swarms seldom issue earlier than nine o'clock or later than three, and usually choose a fine clear day. Not so with after swarms. They are liable to issue at almost any time during the day, and often in cloudy weather. They are apt to go farther from the hive to cluster than first swarms, and, being very small, are not always found unless seen while upon the wing. Second swarms ordinarily issue in from eight to twelve days from the first; and all after-swarms must be out by the eighteenth day, after which no more swarms need be looked for from that hive, unless a "buckwheat swarm" is thrown off in August, which is an unusual occurrence.

LOSS OF QUEENS.

If a queen is lost or removed from a colony, when there are eggs or young larvæ in the worker combs and drones in the apiary, the workers almost immediately commence constructing queen cells to repair the loss. In due time a queen comes forth, and when every rival in the hive, whether mature or in embryo, has been destroyed, the remaining queen must run some risk of being lost in her flight to meet the drones for impregnation. Like-

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wise, when a stock has swarmed, there remains in it a young queen to be fertilized. Consequently, should she be lost on her "bridal tour" the stock is left without either a queen or material from which to rear one, as the eggs left by the old queen at her departure, with the first swarm, are too far advanced to be used for that purpose.

Queens are seldom lost except while making these excursions, when they are sometimes caught by birds, but far more frequently slain as intruders by entering the wrong hive on their return, mistaking it for their own. The bereaved colony will exhibit the greatest agitation. Bees will be running about the entrance and up the sides of the hive, searching everywhere for their beloved queen. This commotion is very noticeable the next morning after the loss, while other colonies are quiet, and for two or three mornings as it gradually wears off. The bees will sometimes work with their accustomed vigor, and, still hoping to succeed in rearing another queen, their drones are preserved, after those of other stocks are destroyed. There being no farther increase in the colony, it dwindles away as daily losses occur, and, should the bee-keeper not come to the rescue, must ere long fall a prey to worms and robbers. The loss of queens is usually the result of placing hives of the same color or general appearance too close together. Colonies that have *young queens* to be impregnated should stand five feet or more apart. Such colonies are all old stocks that have cast swarms, and all swarms after the first from any stock. Also, if the hives appear much alike, each one should have a different mark to guide its queen in returning to her hive. When using *common hives*, the bee-

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keeper should glance at his hives every morning during the time of greatest danger, which is about the third week from the first swarm. If any colony seem unusually excited, see it again in the evening and next morning, and, if still "suspicious," go to a stock that has swarmed within a week, invert it, drive the bees down with smoke and cut out a *sealed* queen-cell, which may be given to the queenless stock by fitting it into one of the brood-combs (see "Nucleus Swarming,") near the cluster of bees. Care must be taken not to injure the cell by pressure, or to leave its point resting upon the comb. But, if such cell cannot be found, then take instead, from a stock having a fertile queen, a small piece of worker comb containing eggs and larvæ. Give this to the queenless stock by fitting it into an opening in one of the brood-combs or fastening it between two of them up among the bees. If fastened between the combs, let the cells containing the eggs be placed in a vertical position with their open ends downward. With movable comb hives, the case is different. By their use, we can easily ascertain the condition of a colony at any time. In such hives, all stocks that have unimpregnated queens should be examined about the twelfth day from the time the first swarm left, and, if no eggs are found in the combs by the eighteenth day, the stock is probably queenless. Give them a reserve *fertile* queen or queen-cell, if either is at hand. If not, take from another hive a frame of worker comb containing eggs and young brood, and place it near the centre of the queenless hive. Queens ordinarily lose their fertility or die of old age, when from three to four years old. If this happens in winter or early spring, break up the colony, before its stores tempt other

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stocks to robbery, giving the bees to another colony. Such a stock can seldom be induced to rear a queen at this season if furnished with material, and even though it should, the bees would nearly all be gone before she could replenish its wasting population, should she eventually chance to become fertile.

The loss of the queen may often be detected in the common hive when clearing the bottom-board of worms and litter. (See "Management for April.") Carefully scrutinize the droppings on the bottom-board each morning for eggs or immature bees. If one of either is found, mark that hive as having a fertile queen. It is at this season an indication of queenlessness, if the workers bring in little or no bee-bread while other colonies are carrying in plump, large pellets upon their thighs. If the condition of a stock is not determined in a reasonable time, it should receive special attention. Turn the hive bottom up, letting the sun shine down between the combs. If no worker brood can be seen, drive the bees down with smoke and cut or break out some strips of comb, working down among the bees. If any worker eggs or brood is found it is enough. But, if only lengthened worker cells, with oval caps are found, they contain drone brood, the eggs having probably been laid by a fertile worker. If the "doubtful" stock is in a movable-comb hive, it may be opened on a mild day, and the combs examined near the centre of the cluster of bees. If worker eggs or brood is found, it is conclusive evidence that a fertile queen is present. But, if only the scattering oval caps are seen, join the bees to another colony, and preserve the combs for new swarms, or to exchange for frames of sealed honey.

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UNITING WEAK SWARMS.

"*The greatest profit lies in saving bees, not in killing them.*"—EDWARD PRINCE.

The old practice of destroying the bees, in order to secure the honey, thus throwing away all prospect of future gain, for a little present advantage, is not only cruel but wholly unnecessary, and should be discountenanced by every admirer of this untiring little busybody.

Two weak families, when united, will consume little, if any more honey, than each would if left separate. The reason of this is, a strong colony is able to maintain the proper degree of warmth in cold weather, which greatly lessens the consumption of food. As soon as the autumn frosts have killed the flowers, colonies that are too weak to protect their stores are much exposed to robbery. Such, may either be strengthened by bringing bees from a distance, (see "How to Collect an Apiary,") or two of them may be joined together. When uniting stocks, smoke them thoroughly and shake the bees into a box or upon a sheet, together. Sprinkle them with sweetened water to prevent quarreling, and to keep them quiet, and hive as a single swarm. Stocks in the movable-comb hive may be united without shaking the bees from the combs, if early in the spring or in cool weather in the fall, or when the flowers yield a bountiful supply of honey, as the bees are then very peaceable. Treat them to tobacco smoke, which will induce all to fill themselves with honey, and serve to give them the same scent. Remove the combs with the bees adhering and place them together in the same hive, leaving

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out the frames containing the least honey. If one of the queens is known to be very old, she may be taken away. After closing the hive, place it upon the stand previously occupied by the stronger of the united swarms. In uniting bees, when the weather is warm enough for them to fly, it must not be forgotten that, unless carried a mile or more away, they are strongly inclined to return to their old stand. To prevent this, give abundant ventilation, and close the entrance till near sunset. Close it again early next morning, opening it half an hour before sunset to permit the bees to fly. On the morning of the third day blow a little smoke into the hive and leave the entrance open, as the removed colony will not now return to its former stand. New swarms, before being hived, have given up their established location, and two or more of them may be joined together and placed upon any stand desired.

Second swarms are often worth but little, if hived separately. But, if two are united, they will seldom fail to fill their hive and be in good condition for wintering. When using the common hive, they should be united if practicable, but with movable comb hives their issue should be prevented.

Swarms issuing the same day will unite peaceably, or a swarm may be joined to another that has been hived three or four days, but, after that, a union is more difficult in the common hive. When such swarms do not issue about the same time, so as to be hived together, let them stand in separate hives till sunset. Then place the one first hived upon a sheet, raising the edge of the hive that the other swarm may enter. Bring the other hive and shake the bees out upon the sheet. If the queen is seen, while

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the bees are entering, she should be taken away, as the other queen may already have become fertile.

If a colony is found to be queenless in early spring, add its bees to some weak stock having a fertile queen. To do this, sprinkle the bees with diluted honey or water sweetened with sugar, which, at this season, will usually procure them a kind reception.

PREVENTION OF SWARMING.

We have given an easy and certain method to prevent after-swarming, but to prevent the issue of first swarms is sometimes more difficult. Some, who prefer an increased amount of surplus honey to an increase of stocks, effect the object by clipping one of the queen's wings, when she cannot leave with the swarm, and will shortly return to the hive. The queen, however, in attempting to accompany the swarm will usually fall to the ground directly in front of the stand, therefore a broad board should slant from the alighting board to the ground to enable her to crawl back into the hive. When the issue of the swarm is observed the queen should be found and returned, for should she fail to get back the swarm would probably reissue upon the hatching of a young queen. Great care must be taken not to clip the wings of the young queens before they have become fertile, else they will remain barren and worthless. Another way is to examine the combs every ten days while the *swarming fever* lasts and remove all the queen cells. If while doing this, more room be given in the body of the hive by removing a frame of honey, two examinations will usually suffice.

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QUIETING AND HANDLING BEES.

Before a swarm issues from a hive, the bees fill their sacs with honey to last while on their journey and aid them in starting in their new home. While thus filled, they are (like a man soon after dinner) uncommonly good natured and obliging, seldom showing any rough *points* of character. Yet, lest some "luckless wight" might have been sleeping on the outside of the hive while its comrades were filling their "jackets" within, we will give the clustered swarm a slight sprinkling with diluted honey or sweetened water. If they were docile and tractable before, they are doubly so now. We may shake them down, hunt out their queen, or perform with them any operation we wish and they will not sting us, unless we compel them by pressure to do so. Here we have the true explanation of all the "charms," "secrets" and "recipes for taming bees," with which unprincipled venders have long humbugged a too credulous public. The whole art of "taming bees" is embodied in the following:

1st. A honey bee filled with "liquid sweets" will not sting of its own accord.

2d. Bees, when frightened, will generally fill themselves with honey, and if given liquid sweets will invariably accept them.

Bees may be frightened thus:

1st. By blowing upon them the smoke of spunk, tobacco or cotton rags.

2d. By confining them to the hive, and rapping the sides of it lightly with a small stick. At first, the bees will try to get

NOTE.—Wood nearly rotten we have found to be much better than a roll of cotton rags for smoking bees.

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out, but finding that impossible they will then rush to their stores and fill themselves with honey.

In the general work of the apiary, such as removing combs, queen-cells, boxes of honey, &c., we seldom use anything but smoke from a roll of cotton rags. These rolls should be an inch or more in diameter, and rolled just tight enough to burn and not blaze, and should be kept on hand with some matches in a dry place near the apiary. When a stock is to be opened, light one end of a roll and blow a few whiffs of smoke into the entrance, wait a few minutes for the bees to fill themselves with honey, then blow in more smoke and remove the cap, loosening the frames with a knife, direct a little smoke between the combs, and proceed to perform any operation desired. If other stocks are close and the bees interfere, blow smoke into the entrance of each hive. Toward fall, when bees have become rich in stores, they are harder to control. They are also more irritable in cool, cloudy weather, which prevents them from visiting the flowers. At such times, a little smoking tobacco scattered upon and rolled up with the rags, will effectually tranquilize them. Or, if addicted to the use of the pipe or cigar, the rags may be saved. In short, by the use of smoke, timely given and repeated as needed, bees may be kept in subjection for any length of time. Some use water, sweetened with sugar or honey. Sugar is preferable as the scent will not so readily attract bees from other hives. Sprinkle it upon the bees with a small clothes broom. Give them time to fill themselves, and they will have no disposition to sting. The sweetened water is very useful in uniting, and for keeping swarms quiet when away from their combs. Although, by using care and gentleness in

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our manipulations of the hive, the risk of being stung is small, we advise the beginner to use a veil for the face till he has gained courage and experience, when it may be dispensed with. This veil may be a piece of coarse black millinet, fastened to the rim of a summer hat and tucked in about the neck. The rim of the hat holds the veil away from the face, making it safe, cool and comfortable. The cost of the millinet, hat included, is trifling, and several may be trimmed and kept for visitors who wish to view the wonders of the apiary.

For a screen to carry in the pocket, to use when away from home on any kind of hat, get one-and-a-half yards of millinet or any coarse, open stuff. Gather one side of this into a band that will slip over the crown of the hat down to the brim. This may be secured with a string under the vest collar. If the fabric used is dark-colored and very coarse, it will not tire the eyes or scarcely obstruct the vision.

When at work among the bees, avoid making quick motions or jarring the hives. If a bee come buzzing *threateningly* about, never strike, but keep your head bowed and the rim of your hat and your hand will protect your face. A bee flies in a direct line, and will not dive down to come up into the face. Should the bee refuse to leave, walk quietly into the shade of a tree or into a building. The poison of a bee sting may often be neutralized and swelling prevented, by quickly applying strong spirits of hartshorn. Amusing feats may be performed with bees, when filled with sweets, by confining the queen in a small wire-cloth cage and fastening it upon the hair, whiskers or in your hat, when the swarm will harmlessly cluster around their queen.

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CHAPTER III.

BEE PASTURAGE AND PRODUCTS.

"Honey is not made by the bees, but is simply gathered by them from the nectaries of flowers, and from that peculiar deposit on vegetation during summer, called 'honey dew.'"—DR. KIRTLAND.

HONEY is a liquid sweet secreted by flowers, and is gathered and stored in the combs unchanged by the bees. If a stock of bees be fed on inferior quality of syrup, and the combs examined, it will be found in the cells unchanged. Hence the quality of honey depends upon the flowers from which it is gathered. White clover, linden, raspberries, &c., affording light-colored honey, while buckwheat, poplar, and dandelion, yield that which is darker.

Honey and pollen are supplied by nearly all the flowering trees and plants of the vegetable kingdom. The varieties, in the northern States, which furnish the largest proportion are, first in the spring, the alders, soft maple and willows. These come very early, and, if not cut short by frost, stimulate breeding, and form for the bees an acceptable change from a spare winter diet. There is then, in most places, a scarcity of flowers for about three weeks, when the hard or sugar maple throws out its golden tassels, and the peach, pear, cherry and smaller fruits, rich in honey and bee-bread, extend an invitation which is never slighted by the provident bees. The apple-tree blossoms now afford a real

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harvest. Raspberries, especially the red varieties, yield an excessive flow of excellent honey. The month of June brings the white clover, which, in the older parts of the country, is usually the chief source of surplus honey, and of great value everywhere. It continues in blossom about two months, yielding large quantities of superior honey. The tulip-tree, by some called poplar, by others, whitewood, blossoms soon after the appearance of the white clover, and secretes much pure saccharine matter, nearly a teaspoonful being often contained in one of its large bell-shaped flowers. We once had an apiary located near the grove of this timber, and every fine morning, during the time it was in blossom, the bees seemed to be swarming over a ten acre field in the direction of the grove. Catnip, borage, strawberries, honeysuckles, mignonette, hoarhound, motherwort, and various kinds of garden flowers, are rich in honey and valuable when in sufficient quantities. The locust tree, either yellow or black, is a great producer of honey, and while in bloom, the bees will swarm around it to the neglect of other flowers. About the first of July, the linden or basswood opens its ten thousand fragrant petals. Where this timber abounds, the bees reap from it a rich harvest. Mustard is, also, an especial favorite. Corn tassels afford much pollen, and vines of the pumpkin, squash, &c., yield honey. In some seasons, what is called "honey dew," makes its appearance on the vegetation. It is usually confined to a few varieties of trees, giving the leaves a glossy appearance, and is sometimes so copious as to make them quite sticky. The dew of each succeeding morning makes it available till a rain dissolves and washes it away.

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Buckwheat continues blossoming for from three to five weeks, keeping the bees busily employed, beside enough honey wasting by evaporation to perfume the air for a considerable distance around. A farther supply is furnished by golden-rod, fireweed, English smartweed, asters, and various other fall flowers. We have omitted to mention many trees and plants that are quite as valuable for their honey bearing properties as some of those enumerated.

OVERSTOCKING.

To a person unacquainted with the immense honey resources of our country, a question will naturally arise as to how many stocks of bees may be safely kept at one point, and whether there is no danger of collecting so great a number as to exhaust the natural supplies of honey. In reply, we would say that we believe it possible to overstock a given locality, and yet we have never been able, in our own experience or otherwise, to get sufficient evidence to confirm us in this belief. Mr. H. B. Gifford, in the *Prairie Farmer*, says: "I knew of one neighborhood, east, a thickly settled place, where nearly every family kept from one to fifty swarms. It is said they get as much honey per swarm as they used to when there were but few kept, and a double price for their honey."

At times the supply of honey seems almost inexhaustible During these harvests the flowers secrete honey through the night, which must be gathered in the fore part of the day, or it is lost by evaporation with the noonday sun. Upon this point, Mr. E. T. Sturevant, an extensive bee-keeper of Northern Ohio,

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writes as follows: "A kind Providence furnishes this bountiful supply each day, and if workers are not on hand to gather it on that day, it is gone. I have never known a season when this honey harvest did not enable every strong colony, in the course of a few days, to lay up an abundant supply for its own consumption, and a generous surplus for its owner. To secure this result, however, the hives must be abundantly supplied with workers. The whole secret lies in *strong swarms*. The rapidity with which swarms, at this period of the year increase in weight, is surprising, ranging from three to five, ten to fifteen, or even eighteen pounds per day. My own bees, the last season, built combs and stored honey in their surplus boxes only from twelve to fifteen days. The shortest harvest I have ever known. In this short time, many of my swarms collected, in addition to an ample supply for their own consumption, from thirty to thirty-five pounds surplus. The same would have been true had the number of stocks been ten times as great. I am satisfied it makes but little difference how many strong swarms are collected together; a few days will make them all rich."

We visited Mr. Sturtevant's apiary about the time of this writing, and found it to contain something over two hundred swarms. We have seldom kept more than one hundred stocks in one place, preferring to keep them at different points, two or three miles apart, but after all, we believe the question of overstocking to depend in a great measure upon a continuous and abundant supply of flowers, from early spring till Autumn. Where this supply can be had little fear need be entertained of overstocking.

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In most places, there are, even in the best honey years, times of scarcity, during which few flowers can be found. These vacancies may be profitably filled and immense stores of honey secured by planting out flower-trees, shrubs, and cultivating field crops with especial reference to this object.

For bee pasturage, as well as for fruit, the cherry tree has never been rightly appreciated. Several of the early improved varieties bloom in a time when most needed by the bees, and even the latest are fully improved by them. The raspberry continues in bloom about three weeks, and few flowers furnish so large a quantity of purest nectar. The fruit is a surer crop even than the cherry, and every one knows that "purple cane," "black cap" and "orange" raspberries, and "sweet cherries," do not always need to be taken to market to find purchasers.

Let your lanes and avenues and the front of your grounds be lined with the locust, linden, hard and soft maple, tulip and chestnut. These are beautiful shade and ornamental trees and will increase the value of your property ten times the expense of planting them. A pleasing contrast is produced by interspersing among them cherry, apple and other fruit trees, all affording large supplies of delicious honey.

CULTIVATING HONEY CROPS.

White clover stands first on the list of honey crops. When sown with other grasses it is valuable for hay, and for pasture it cannot be excelled. Where it is abundant there are never bees enough to collect one-fourth of the honey it affords. Red clover secretes much honey, yet it is mostly beyond the reach of the common bees, but Italian bees store honey from it to a much

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greater extent, though chiefly from the smaller blossoms, and the second growth or aftermath. Mustard is one of the most profitable crops to cultivate, as well for its seed as a pasture for bees. It should be thinly sown, and lightly brushed in during April or May, upon good soil, and cut rather green to avoid waste by shelling. It yields from ten to fifteen bushels per acre, and sells readily to manufacturers in large cities at a high price. Even an acre or two of mustard is of great advantage to an apiary, as it keeps branching and blossoming nearly all summer. In most parts of the country there is a dearth of flowers from the fall of the apple-tree blossoms till white clover comes in. To fill this vacancy a plat of turnips may be sown each year. Gather the largest for market or to feed to the stock, and enough small ones will remain in the ground to run to seed the next year, to make a rich pasture for the bees in the most critical part of the season, greatly favoring the advent of early swarms. The value of a field of buckwheat for both bread and honey is well known. In speaking of it as a honey crop, Mr. Harbison says: "When the weather is favorable the bees store honey from it very rapidly, faster at times than they can build combs to receive it. I have seen them fill pieces of old comb, laid close to the entrance of the hive, with honey, and have known colonies to fill four boxes of honey, or about fifty pounds during the continuance of buckwheat. This is by no means an uncommon occurrence, and goes to show that this honey harvest is one of great importance to the bee-keeper. Buckwheat may be sown about a month earlier than usual, to furnish pasturage, to come in about the close of clover to great advantage."

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We would add that where linden or basswood abounds it is unnecessary to sow buckwheat (except that sown very early) before the middle of June, but where this timber is scarce sow some the first of June. Mr. Harbison continues: "It is much easier to cultivate and produce enough pasturage, in addition to that from natural sources, to supply one hundred hives of bees than it is to provide pasturage for one hundred head of sheep, and the profit on bees will more than double that of sheep."

Thus far we have only advocated the cultivation of such crops for bees as are also valuable for their grain or seed, our object being to fill with the greatest profit, the vacancies between natural supplies and afford the bees an uninterrupted succession of flowers in greatest abundance from spring to fall. These vacancies mostly occurring when the weather is unusually warm and pleasant, the bees, if supplied with flowers, have every facility for increasing their stores. Catnip will well repay cultivation for honey alone. It continues to blossom for a long time, the bees working upon it with the greatest assiduity "from early morn till dewy eve."

POLLEN

Pollen, or bee-bread, is the fertilizing dust, or fine meal-like substance discharged by the anthers of flowers. It is used for feeding the young and immature bees, great quantities being collected for this purpose and carried to the hives in little balls or pellets upon the thighs of the workers. Pollen is furnished by different species of flowers of almost every variety and shade of color, the most common being yellow. This has caused some

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to mistake these little yellow pellets for wax, to be used in comb building. Such should observe that just as much pollen is taken to hives already filled with comb, as to any others. In order to stimulate breeding in early spring, unbolted flour is sometimes used as a substitute for pollen. The bees will not accept it unless given before much natural pollen can be had. Where snow prevents flowers starting until long after the bees begin to fly, such feeding should not be neglected, especially in large apiaries. It will prevent robbing, strengthen the stocks, and encourage habits of industry. Unbolted rye flour is best, but bolted flour may be used if mixed with sawdust or cut straw. If spread on boards, with strips tacked on the edges to prevent waste, and placed in some sunny corner out of the wind, the bees will work upon it quite freely.

PROPOLIS OR BEE GLUE.

This is a resinous gum collected by the bees from the leaves, buds and trunks of trees and plants, and is used for coating over uneven surfaces, and for filling holes and cracks within the hive. When cold, it is very hard and brittle, being quite a different substance from wax of which the combs are composed. Thus we find honey, pollen and propolis the only substances *gathered* by the bees.

WAX AND COMB BUILDING.

As animals must be fed large quantities of grain to enable them to secrete a few pounds of fat, so bees, on a like principle,

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consume from fifteen to twenty-five pounds of honey, (Dr. Kirtland says twenty-five,) for the production of a single pound of wax. The wax exudes from the rings or folds of the abdomen of the worker, forming thin flakes or scales, which are removed as fast as formed and used for constructing combs. It takes about two and a half pounds of wax to fill a hive of ordinary size with comb. By confining a swarm of bees in a movable-comb hive and feeding them, the bees will build comb, consuming about twenty pounds of sweet to produce one pound of comb or wax. It will readily be seen that wax is by far the most expensive article used by the bees. The time spent in constructing the comb should also be taken into the account, which, if occupied in gathering honey, would, at this season of the year, enable them to store much more, and making the cost of a pound of comb equivalent to at least twenty-five pounds of honey. This honey, at twenty-five cents per pound, would give us six dollars and twenty-five cents as the cost of a pound of comb. Good combs melted into wax and taken to market might bring forty cents per pound, which, deducted from the cost price, would show a loss of five dollars and eighty-five cents on every pound of wax sold. These estimates show that the bee-keeper cannot afford to melt down any combs that can be used to advantage by the bees. Even drone comb, if not *too* dark colored, should be used in the surplus boxes. If first swarms are put into hives furnished with empty combs, they will often fill them in an incredible short time, and swarm the same season. For saving all good pieces of comb, whether large or

8. Abdomen of the worker magnified, showing the scales of wax.

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small, movable-frame hives are indispensable. In filling up an empty frame lay it upon a table or board, and fasten in the combs by dipping an edge of each piece into melted comb. The scraps may be melted and should not be very hot. It soon cools, leaving the combs firmly attached. Frames when thus filled may be given to strong colonies in exchange for frames of honey. Stocks kept supplied in this way through the gathering season, will store astonishing quantities of honey, and in autumn, if any lack provisions for winter, it is easy to give them some of the full combs previously removed.

HOW TO SECURE STRAIGHT COMBS.

The *full* advantage of the movable-comb principle is only secured by having *worker* comb built *within all* the frames. Upon the first introduction of movable frames, bee-keepers often failed to prevent the bees from building their combs across the frames, as many yet do, and until recently but few attempted to prevent the bees from building drone comb. Sometimes strips of comb are attached to the under side of the top bars of the frames. This is a very good practice, as it gives the bees a start *within* the frames with *worker* comb. The difficulty of obtaining comb for the purpose, especially in long strips, made it necessary to use a wooden guide, and it was discovered that the bees were more certain to follow the guides by elevating the rear end of the hive. Thin partitions of wood were tried, but they obstructed the heat, made the hive an unnatural dwelling place for the bees, and also failed to accomplish the objects sought. We invented the slot closed top frame, and secured the same by Letters Patent,

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October 10, 1865, which dispensed with the honey board and shallow chamber between that and the frames, leaving no space for the bees to cluster between and above the frames, which compelled the mass of bees to cluster on the central bars, and aided greatly in inducing the bees to build the frames. We next discovered that a thin strip of wood was better than any other shape, and when the lower edge was dipped in melted wax and pressed with our comb dies to form the base of cells of worker comb, the bees would not only have a start with worker comb in all the frames, but were sure to follow such guides and build their combs within the frames so that they could be lifted out and exchanged at pleasure.

Realizing to some extent the great value of this invention, we determined to secure it by Letters Patent, and early in 1868 went to Washington and made application, which was granted September 8th, with other points noticed in a foot note on pages 140 and 141.

With the improved movable-comb frame, the tops fitting closely together, leaving no corners projecting except the sharp edge of the worker comb comb-guide, we find it unnecessary to tip the hive forward to secure straight combs built within the frames, and since the spring of 1867 we have taken care only to have the stand level, that the sides of the hive may be perpendicular. Bee-keepers know the value of worker comb, and that bees will seldom change and build much drone comb when they have a start with worker comb in all the frames, especially when the comb is built by a colony having a young queen, as is the case in all second swarms; also nucleus swarming and the process described in the last article on page 70.

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SURPLUS HONEY STORED IN BOXES.

Those having bees in common hives, and all who wish their surplus honey stored in boxes, will obtain the greatest amount and avoid many disappointments by attending to the following conditions:

1st. The boxes should be tight and large, but not over four or five inches high, and protected from the changes of the weather by an outer cap.

2d. The bees should be induced to commence in them by attaching pieces of clean empty comb to the under side of the top, and placing the boxes directly over the breeding apartment, with large openings under each box to admit the bees.

3d. Early in the season select a few populous stocks, giving a box to each, and when the bees have commenced in them, give boxes to the next strongest, being careful not to give too much room till a start has been made.

4th. Keep the hives cool by shading from the sun, and if the bees cluster outside, when flowers are plenty, ventilate by enlarging the entrances and giving more room in the boxes if needed.

After a populous stock has nearly filled its boxes it will often take long enough time to finish them, to have half filled empty ones, besides the difficulty so often experienced in getting the bees to commence in the boxes after those first filled are removed, which objections are both overcome in the American hive, described in the chapter on hives.

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HONEY BOXES.

The honey boxes should have at least one glass side. If the small pieces of comb attached to the top are placed crosswise of the box and two inches apart from centre to centre, the honey will be in convenient shape for the table. Some use a case or box, without bottom, six inches deep and nearly as large as the top of the hive. Small frames are suspended in this and the top closed with a lid; only a part of these frames should be removed at one time, replacing them with frames containing pieces of nice empty comb. By this arrangement the honey is obtained in small quantities, the frames holding about three pounds each. The bees will store more honey in large than in small boxes, as the heat is better economized for comb-building.

In the vicinity of cities, honey is often secured in various fancy shapes, hearts, circles, &c., and sold to confectioners for wedding and other occasions at enormous prices. This is done by cutting a hole in a board the desired shape and attaching a piece of white comb to its highest point, after which the board is placed in the box or hive instead of a frame. Bees will fill glass jars and tumblers if a piece of comb be attached for a commencement. To get such receptacles nicely filled with pure white comb they should be placed upon the hive at the commencement of the honey harvest.

HOW TO REMOVE HONEY BOXES AND EXPEL THE BEES

Near sunset remove the cap and raise the end of a box just enough to blow under a little smoke, when the bees will leave

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the holes, which may be covered with blocks or an empty box turned bottom up. Set the full boxes right side up on strips upon the stand, so that they shall be three-eighths of an inch from the board and five or six inches from the entrance of the hive. Gently rap upon the boxes until the bees begin in good earnest to leave for the hive. Being filled with honey there is no danger of their stinging from the rough treatment received. The humming of those that enter will give notice to the others of their position near their home. Should some remain in the boxes they may be left till morning if the weather be pleasant, but must be removed early lest the bees commence carrying the honey into the hive. If preferred the boxes may be placed upon their sides in a tight box or barrel, and a thin cloth thrown over the top. Seeing the light the bees will creep up on the cloth, and if this be turned over occasionally all except a few young ones will find their way back to the hive. Late in the season, when the nights are cool, if the cap be raised in the evening, the boxes will usually be clear of bees by morning. As soon as the flowers have failed or the bees commence carrying down honey from the unsealed cells, all boxes should be removed, unless, as is sometimes the case, when the latter part of the season has been unfavorable, an insufficient supply has been stored in the body of the hive. In this case not only allow the bees to remove the honey from the unsealed cells, but shave the caps from the others, when all will be carried below.

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REMOVING DEFECTIVE COMBS.

Certain persons would have us deprive our bees of their combs every two or three years, and compel them to build anew. This we consider a useless waste of the time and material of the bees, for although every litter of brood leaves a cocoon or thin lining in each cell, the cells were large at first, and the cocoons are so thin that after the lapse of ten years no perceptible difference can be seen in the size of the bees, the combs meanwhile becoming warmer and safer for the swarm in winter. The above practice is universally condemned by our best practical apiarians. One of them, while advocating the removal of worthless or defective combs, says:

"What old bee-keeper has not had abundant proof that stocks eight or ten years old, or even older, are often among the very best in his whole apiary." Stocke says he saw a colony which he was assured had "swarmed annually for forty-six years."

The common practice of some bee-keepers, of breaking out the lower combs from common hives, if the combs happen to be dark colored, is to be discouraged, for when done in early spring the stock that year will often fail to be productive either of swarms or surplus honey. Yet when movable frames are used, if healthy stocks and early and vigorous swarms are desired, we should make a general examination as soon as spring has fairly opened, and place every stock upon a fair footing for the work of the season. Portions of the comb are liable to become useless from various causes. If the hive was not properly ventilated, the lower edges of combs may be mouldy. The

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brood combs may contain old sour bee-bread, which the bees are unable to remove, and this is a frequent cause of failure. There may be a great excess of drone-comb. If combs are defective in any of these points, trim off so much as is defective and *no more.* In the Eastern States, where the disease called "foul brood" is known, the bees of the diseased stock must be driven from their combs into an empty box, letting them remain without combs thirty-six hours, till free from the honey taken with them, when they may be put into a *new* hive and fed in the chamber if necessary. Carefully keep the honey from the bees, else other stocks will contract the disease. If heated to the boiling point, it is said, the honey will be harmless and may be used for feeding. The disease has never been known west of the State of New York, bee-keepers having been careful about obtaining bees from infected districts.

MELTING COMBS INTO WAX.

All *waste* combs should be rendered into wax, by crowding them into a sack made of coarse open cloth and placing it in a kettle of boiling water. Continue to press it with a hoe, removing the wax as it rises to the top. Wax may be bleached perfectly white by forming it into thin flakes, by pouring it upon the surface of tepid water and afterwards spreading it upon canvas, out of doors.

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CHAPTER IV.

ARTIFICIAL SWARMING.

THAT bees may be swarmed artificially, although not known to all even at the present day, is not a late discovery, but has been practiced for over a century, with more or less success, depending entirely upon the observance of the three following conditions, to wit: the *proper time* for swarming; the condition of the stock; and whether the method employed was in harmony with or in violation of the laws which govern the economy of the hive.

1st. The time for swarming is not until the yield of honey is abundant and drones are numerous in the apiary, nor should it be performed so late in the season that the bees will not have time to become strong in numbers and rich in stores before the frosts of autumn cut short the pasturage. The safest rule, for the inexperienced, is to wait until natural swarms begin to issue, *unless* he can have a finished queen-cell to give the queenless part, or, what is much better, a fertile queen, in which case he may swarm somewhat earlier or later than the usual time for natural swarms.

2d. The stock to be swarmed should be very populous, for if swarmed when too weak, it is thus robbed of its power to generate heat for breeding, and should unfavorable weather

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ensue both parts will often be deficient in numbers and stores for winter; whereas, had the stock been left until it could have spared a swarm, both would be prepared for winter, beside yielding ample returns in surplus honey as the reward of proper management. There will sometimes be a season when these conditions will not occur in all the stocks in the apiary. Such stocks should not be swarmed that season. *The only safeguard against poor seasons is* STRONG STOCKS, for they will work while others are idle.

3d. The value of any method depends, in a great measure upon the certainty of, and the time required for, supplying the queenless part with a *fertile* queen. Yet, the method any one should adopt, or whether he should allow his bees to swarm *once* naturally, will depend much upon his desire for increase of stocks, and the number of colonies or apiaries he may wish to manage. Hence, we shall describe several methods, contrasting their advantages and disadvantages with natural swarming. The practice of multiplying colonies by artificial means, has the following advantages over natural swarming:

1st. The trouble and risk of swarms issuing when the bee-keeper is absent, or several issuing about the same time and clustering together or leaving for the woods, is avoided.

2d. As soon as the stocks are in proper condition they may all be swarmed when most convenient and you are certain of the increase; but in natural swarming, only a *few days* of bad weather will frequently cause the queen cells to be destroyed and swarming to be postponed for weeks and often till the next season.

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DRIVING OR FORCED SWARMING.

The discovery that when a queen is removed from the h ve in the swarming season, the bees will supply her place by rearing a queen from an egg or young larvæ that otherwise would have roduced a worker, led to the practice of forced swarming or driving from the box hive. The object is to drive out a portion of the bees with the queen to form the new colony, leaving those remaining in the old hive to rear a queen from worker brood.

For driving bees, a warm day should be chosen, and if the driven swarm is to be put into a movable-comb hive, prepare it by inserting a frame taken from another stock containing honey and young brood, to keep the swarm from absconding. Immediately upon removing the stock to be drummed, let an assistant put the new hive thus prepared in its place. If the weather be pleasant and bees in full flight, enough will return from the fields to keep the brood warm by clustering upon the comb inserted, and they will thus be prevented from entering contiguous hives. Before removing the stock to be drummed, blow under a few whiffs of smoke, to drive the bees up among the combs. Carefully *invert* the hive, a little away from other stocks, in the shade. Having ready a "driving box," (an empty hive will do,) place it upon the old stock, so that the hives shall fit closely, mouth to mouth. Wrap a strip of cloth around the junction of the two hives, closing all apertures so that not a bee can escape. Now, with two light sticks, rap smartly around the lower hive for two or three minutes, then wait a few minutes for the bees to

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fill themselves and rap again. Continue rapping at short intervals for about twenty minutes. If enough bees have not ascended by this time, continue drumming a little longer. The loud buzzing is a sign of submission, and marks the upward movement of the bees. The drum-box may be slightly raised for examination, or for greater convenience may have two wire-cloth windows inserted in opposite sides, through which to see the bees. These windows should have slides to darken them. There should also be cross-sticks inside the box for the bees to cluster on. Having secured our swarm in the drum-box, it must be taken to the old stand and the parent stock placed at some distance on a new stand. We might now proceed to hive the swarm were we certain that we had succeeded in forcing out the queen. To be sure of this, place the drum-box, containing the swarm, upon a clean bottom-board and examine after a few minutes for eggs, which the queen will be compelled to drop for want of cells in which to deposit them. However, should no eggs be seen, the presence of the queen may still be inferred, if the bees remain quiet and do not commence running about in quest of her within half an hour. Now spread a sheet, or any large cloth, upon the ground close to the old stand, slightly remove the new hive and place it on the end of the sheet. Remove the small slide and entrance block to give the bees the full width of the entrance. They may now be shaken from the drum-box upon the sheet, about three feet in front of the new hive, and a few of them directed to the entrance with a quill or piece of shingle. These, by their humming, will attract the others, and a steady stream will commence moving toward the

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hive. The queen will frequently be seen to enter among the rest. The old bees are the first to start, leaving most of the young ones back upon the sheet. If the swarm be large, when all have entered but a quart or two, take them up with the sheet and carry them to the old stock, as that is often too much weakened by drumming, to properly nurse the brood, and its strength will be still further reduced by some of the older bees returning to their former location. But these upon the sheet being all young bees will remain wherever placed. If, however, we did not see the queen enter the new hive, these young bees must not be allowed to enter the old stock without being made to crawl slowly over the white sheet, to see that the queen is not among them. If she be found give her to the drummed swarm in the new hive. If from any cause the drummed swarm should fail to get the queen, a young queen would probably be reared from the brood in the comb placed in the hive to keep the bees from deserting it, but by the time she would hatch the hive would, in all probability, be filled with worthless drone comb as very little, if any, worker comb will be built while the colony is without a hatched queen. In drumming out swarms, we can secure the queen about nine times in ten, but should we fail she can seldom be induced to leave by further drumming at that time. If an Italian or other queen is not at hand for the drummed swarm, return it to the old stock, placing it on the original stand, and repeat the process another day. Swarms are harder to drive in the cool of the morning than later in the day. Also, if the hive is but partly filled with combs they are less willing to leave it. After a swarm has been driven out valuable

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time may be saved to the parent stock by giving it a finished queen-cell. If this be inserted two or three hours after the drumming it will be less liable to be destroyed. To obtain a supply of queen-cells, an Italian or other strong stock in a frame hive may be divided ten days beforehand.

When an Italian queen is to be introduced, enclose her in a wire-cloth cage and insert the cage in the centre of a comb near the brood where the bees will cluster upon it. In thirty-six hours release the queen, smear her with honey, and allow her to crawl down among the bees. In natural swarming, the old queen continues to lay eggs until she leaves with the first swarm, at which time queen cells are capped over and hatch in about eight days after. But in driving or forced swarming, if the stock contained no queen-cells, and none were inserted, it would take about fifteen days to hatch a queen, hence there would be a loss of several days more than in natural swarming, unless we insert a queen-cell, which would hatch in four or five days, giving us a gain of three days over natural swarming, besides, there being but one queen-cell, no second swarm would issue.

We have been particular in giving the details for the driving process, on account of the principles it illustrates and its use in transferring stocks from common to improved hives. But for purposes of artificial swarming it is attended with much uncertainty, for we can never know, as we ought, whether the old stock succeeds in getting a new fertile queen or not, until it is often too late to remedy the evil if one be wanting.

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HOW TO MAKE SWARMS BY "DIVIDING."

We will give the principal methods for swarming bees in the movable-comb hive, any one of which may be used according to circumstances or the choice of the bee-keeper. The following process is the most convenient when making swarms away from home. Spread a sheet upon the ground, and after blowing a little smoke into the entrance of the hive raise it carefully and place it upon the sheet. If it is taken any distance from the old stand, an empty hive should be left, to hold the returning bees. Also place upon the edge of the sheet your new hive, with the cap and frames removed, entrance closed and movable side in. Proceed to open the old hive; meanwhile quieting the bees with your smoke. Separate the young bees from the old ones by shaking them from the combs upon the sheet three feet or more in front of the hive. When shaking a comb, hold it perpendicular, to prevent breaking, and dislodge the bees with a downward shake. If the weather be warm and the combs new and tender, instead of shaking them brush off the bees with a wing or quill. Keep a sharp watch for the queen by running the eye over each comb, both before and after shaking it.

Do not spend much time, however, in looking for the queen, except to be careful not to put her into the hive which is to contain most of the combs. As fast as the combs are shaken, set them into the new hive. If the queen be found, place the comb upon which she rests and another comb containing honey in one of the hives with one-fourth of the bees, and give the balance of the combs and three-fourths of the bees to the other

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hive. Fill the vacancies in both hives with the empty frames, and place the one with the queen and two combs upon the old stand, as enough bees will return to it from the one on the new stand to make the colonies about equal. But if the queen is not found while shaking off the bees, place the two combs (one of them containing eggs and young larvæ) in the old hive and put in the empty frames. By this time most of the old bees will probably have entered. When there are but three or four quarts left upon the sheet, place the old hive upon its own stand and let the young bees enter the new hive by making them travel, thinly, a considerable distance over the sheet, that you may find the queen, should she happen to be among them, and return her to the old hive. Contract the entrance of the new hive, which may now be placed in any desired location.

Another way of making new swarms where there are several stocks in movable-comb hives, is to select four stocks and take two combs from each. Brush back all the bees into their own hives, that no stock be robbed of its queen. Fill the vacancies in each hive with empty frames, placing them near the centre, where they will be quickly filled. Place the removed combs together in an empty hive. Remove a strong stock (in any kind of hive) when the bees are flying briskly, and place the hive containing the combs on its stand. If the strong stock were taken a rod or two away, near the middle of the day in good honey gathering weather, enough bees will return to the old stand to make the swarm. Contract the entrance to both hives for a day or two. This method has some advantages, for as each old stock loses but one or two combs at a time, a new swarm

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can be made from every five stocks as often as the loss is regained, and yet all the stocks, both old and new, be in condition for winter, should swarming be continued past the usual season. Whenever the weather becomes unfavorable, or pasturage seems to be failing, swarming should be discontinued till honey is again plenty.

Another method, is to take out half the combs with the bees adhering to them, and place them in the new hive; put in the empty frames, and set the hives a foot or two apart, one on the right and the other on the left of the old stand. They must be watched an hour or two, to keep the bees about equal. If one hive seems to be getting more than its share, move that a little farther from, or the other nearer to, the old stand. A board set up between them and projecting a little in front will help divide the returning bees. If the hives are not the same color, the old one must be partially covered with a cloth, to change its appearance, else it will get most of the bees. If the queenless part be not determined by the motion of the bees, it may be known in two or three days by its having started queen-cells.

If a fertile queen is not at hand for the queenless part, prevent the construction of much drone comb by giving it all but one or two of the combs. In taking them from the other hive, brush back all the bees, lest the queen be removed. If more stocks be divided in eight or ten days, a queen-cell for each queenless part may be obtained from this stock.

The queenless part of a divided stock should have the date of its division marked upon the hive or otherwise noted, for if a queen-cell was not inserted at the time of dividing, it will have

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its queen-cells finished by the tenth or eleventh day, when all but one should be destroyed or used for dividing other stocks. If this is not attended to, a colony will often injure itself by swarming, although it may have but two or three quarts of bees. All colonies raising queens should be carefully examined in about twenty-five days from the time of dividing, or if finished queen-cells were given them, in fifteen days, to see that they have a fertile queen, and if no eggs can be found in the combs the presumption is that some accident has happened the queen. If a nucleus, containing a fertile queen is at hand, introduce her. If neither queen nor queen-cell can be had, give the colony a comb of brood and eggs taken from a hive that has a fertile queen. This will not only enable them to rear a queen, but the maturing brood will materially strengthen the swarm. When dividing, care must be taken in all cases to place the combs containing brood or eggs, compactly together, that the bees may be able to cover them and prevent chilling the brood. By inserting a frame or two of empty comb in each new colony, the brood may be enclosed in smaller space and the heat economized. Queenless or removed colonies should have their entrances contracted for a few days to exclude both the cool air and inquisitive robber bees. In all these methods, as in natural swarming, we are liable to have queenless colonies by the loss of young queens, when making their excursions to meet the drones. Beside, a colony will do little while rearing a queen, which consumes much time, usually in the height of honey gathering. Hence, perfection will not be reached short of introducing a fertile queen at the time of swarming.

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THE NUCLEUS SYSTEM OF SWARMING.

"The introduction of a mature fertile queen to a colony two weeks sooner than when they swarm naturally, is an advantage sufficient to pay for extra trouble. The time gained in breeding is equivalent to a swarm."—M. QUINBY.

In swarming bees on this system, we first rear a queen in a small cluster—nucleus—of bees, allowing the nucleus hive to remain in its place until the queen becomes fertile, when we swarm the bees by simply causing the two hives to exchange places. Unlike natural swarming, the old queen remains in the parent stock, and its labors go on scarcely interrupted. The system is based upon the well known law, that bees, after luxuriating upon the flowers, will return to the exact spot of their old habitation.

Form a nucleus from an Italian or other populous stock by blowing a few whiffs of smoke into the entrance, and opening the hive, select a frame of comb containing capped brood, but especialy plenty of eggs and young larvæ. After looking this over carefully, lest the old queen be removed, place it with its adhering bees in the empty hive, and next to it another comb containing honey, which will afford protection to the brood and food for the bees. As many of the old bees will return to the parent stock, give the nucleus hive at least a quart of bees and set it on a new stand two or three rods distant. Contract the entrance so that but one or two bees can pass at the same time, and set a feed pan on the frames, or a sponge filled with sweetened water will supply their wants until the young bees go to work

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in their new location. In place of the combs removed from the parent stock, set in empty frames with a full one between. If the frames are put near the centre, the old stock will increase all the faster, as the queen will fill the new comb with eggs as fast as it is built. The removal of the two combs stimulates the bees to great activity by giving them room to work, and detaches just bees enough to prevent their clustering idly about the entrance. The nucleus will construct queen-cells and rear a queen as well as a whole swarm. Beside, the queen is easily found among so few bees. We now wait until the tenth or eleventh day, from the time the nucleus was formed, when we open it, and, with a sharp thin bladed pocket-knife, cut out all the queen cells *but one*, and use them immediately in forming other nuclei, by attaching one of them to a frame of comb and bees taken from an old stock, as before described, and placed in an empty hive. In transferring queen-cells great care must be taken not to press or dent them, or expose them long to the hot sun or cool air for fear of destroying the royal occupants. The beginner should remove but one at a time, returning the frame from which it is taken to its place in the hive until the royal cell is adjusted in its new location. When practicable, leave about an inch square of comb attached to the cell, and upon taking the comb of brood from the old stock, make an opening among the eggs and

12. Queen-cell Inserted.

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larvæ where the bees will be sure to cluster upon it and keep it warm, and carefully insert it as shown in figure 12, leaving an open space below it.

If the first nucleus was formed from the only Italian stock in the yard, and more queen-cells are wanted, remove every queen-cell from it, and add another comb of eggs and brood from its parent stock. But when no more queen-cells are needed, leave one to hatch, and as by this time the brood will all be capped over, the bees will be liable to follow the young queen on her excursion to meet the drones. To prevent this, exchange one of the combs for one containing eggs and young larvæ, when forming the other nuclei. Young queens will return unless lost by birds or other casualties, to which *all* queens are *once* exposed. Such loss is easily ascertained among so few bees, and we have only to insert another queen-cell, adding a comb containing eggs and brood, and repeat the trial. Should the parent stock be very populous, it may be swarmed by taking a queen from a nucleus belonging to a less populous stock, and another queen reared there.

WHEN AND HOW TO SWARM THE BEES.

Every populous stock, from which a nucleus has been formed, should be swarmed, if the weather is favorable, as soon as the queen in the nucleus has become fertile. This is, usually, in from six to ten days after inserting the queen-cell, and is readily determined by examining the combs for eggs. We now, unless the yield of honey is very abundant, confine the young queen

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in a gauze wire cage. Having filled up the nucleus hive with empty frames, exchange the places of the two hives, bringing the entrance of the nucleus hive where the old stock has stood, and where the mass of the old bees will return from the fields, thus throwing out of the old stock swarms of workers into the nucleus hive, while the old bees from the nucleus will enter the old hive and minister to the wants of the numerous brood of the parent stock. The bees *must not* be swarmed between the hatching and fertilization of the queen, and should they be swarmed when the honey harvest has received a check from a storm or drought, the bees thus empty of honey and consequently more quarrelsome, being suddenly thrown into the presence of a strange queen (although of the same scent) are inclined to sting her. To prevent this she is caged for thirty-six hours, when the bees from the old stock will mostly have joined the nucleus colony and she may be safely liberated. But, if she was taken from another nucleus, we sometimes let her remain caged a day longer, or smear her well with warm honey and drop her in among the bees. They immediately commence licking up the honey and *forget* to sting her.

If from any cause the stocks are swarmed when the bees are working but little, and after three or four days the nucleus swarm be found deficient in bees, it may be strengthened by exchanging some of its empty frames for frames of capped brood from the parent stock, or should the flowers yield bountifully within a week, the location of the two hives may again be exchanged. The bees will not quarrel as they are of the same scent, unless a nucleus has been formed several weeks, or when honey is scarce,

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it is sometimes necessary to treat both stocks—especially the old one—to tobacco smoke. This precaution, however, is only for the inexperienced, since, in the midst of the swarming season, when the flowers are yielding in profusion, little protection is needed either for the queen or the operator.

ADVANTAGES OF THE NUCLEUS SYSTEM.

The superiority of this system may be seen by contrasting it with any other method of swarming. Unlike natural swarming, by this system all our new swarms have young queens, and as drone comb is seldom built during the first year of the queen's existence, we get the frames filled almost exclusively with worker comb. By it our stocks and colonies are never without fertile queens. Hence, breeding and honey gathering go on as before, keeping all our swarms strong and safe against moths and other enemies. But in natural swarming (which, if properly managed in movable-comb hives, is preferable to most methods) much time is consumed in idleness by the whole swarm rearing a queen in the best part of the season, besides honey gathering is nearly suspended for ten days after the issue of the first swarm, and no eggs are laid for from two to three weeks, or until the fertilization of the young queen, and before these mature, so great is the mortality of bees at this season that the stock is sometimes lost from lack of bees to protect its combs. While, had it been supplied with a fertile queen, it could soon have spared another swarm—so incredibly fast do bees breed during the honey harvest. If by the introduction of a fertile queen, "the time gained

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in breeding is equivalent to a swarm," (and we think no close observer will doubt it,) then it follows that we could swarm a stock twice on the nucleus system with no more risk than swarming once naturally, or that we are as safe against poor seasons as those who increase on an average but one-half annually. Yet as "safety and certainty" is our motto, we recommend only doubling the number of populous stocks, at which rate ten stocks would increase to one hundred and sixty in four years if every stock was swarmed annually, which number may be made good, and even a more rapid increase safely secured by using the surplus honey stored in frames, as directed under "how to stock an apiary." In short, by the nucleus system of swarming, the vexatious losses attending other methods are avoided, and the process is so easy and gradual that even the day-laborer or business man, when supplied with hives, will find leisure time enough to manage a great number of stocks with profit and pleasure.

BEGINNER'S METHOD OF SWARMING.

A hive of bees may be made to cast a number of swarms by removing its queen, or when it has cast its first swarm, set the old stock on the stand of a populous stock, which must be removed a few rods to a new stand, when many bees are at work in the fields. As soon as it swarms again, repeat the process, and it will swarm until there is but one young queen left in the hive.

With one Italian stock, black bees may be Italianized in box hives by repeating the process another year, as described on page 79.

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CHAPTER V.

ITALIAN BEES.

THIS variety of the honey bee, called also Ligurian bee, is found in small districts amid the Alps, embracing portions of Switzerland and Northern Italy. They are of a striped golden color, and were described by Aristotle, Virgil, and other ancient writers, as variegated in color, and the most valuable kind then known, but for centuries they were unknown outside of the districts above named, the surrounding mountains covered with perpetual snow being impassable by their wings.

They were accidentally discovered, during the wars of Napoleon, by Captain Baldenstein, who carried the first colony across the Alps in 1843. In 1853 they were introduced by Dzierzon into Germany, and into the United States in 1860. There has since been several importations. We were slow to believe all the good things said of them by German apiarians, until convinced of their superiority by the universal testimony of prominent American bee-keepers, coupled with our own experience. We present a few extracts.

"We believe that the superiority of the Italian bee is no longer questionable."—*California Culturist.*

"All agreed as to the superiority of the Italian to the common black bee."—*From the Report of the American Apiarian Convention.*

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At the Wisconsin Bee-keepers' Convention, in February, 1866, the following resolution was passed unanimously:

"*Resolved*, That the Italian (or Ligurian) bee, fully sustains its European reputation, and this association heartily recommend it for general cultivation, as being more hardy, vigorous, and fertile, and, as a consequence, more profitable."

"Of their superiority there can be no question."—*Dr. Metcalf.*

Dr. Kirtland, of Cleveland, Ohio, says: "My colonies are daily watched and admired by many visitors. So far as my experience has gone, I find every statement in regard to their superiority sustained. They will no doubt prove a valuable acquisition to localities of high altitude, and will be peculiarly adapted to the climate of Washington Territory, Oregon, and the mountainous regions of California."

Mr. Langstroth says: "If we may judge from the working of my colonies, the Italians will fully sustain their European reputation. They have gathered more than twice as much honey as the swarms of the common bee. This honey has been chiefly gathered within the last few weeks, during which time the swarms of common bees have increased in weight but very little. The season here has been eminently unfavorable for the new swarms —one of the worst I ever knew—and the prospect now is, that I shall have to feed all of them except the Italians."

"The great German apiarian, Mr. Dzierzon, informs us that his apiaries, (now consisting of more than six hundred colonies,) having been thoroughly *Italianized* in 1858, produced him last year (1859) more than double the quantity of honey ever ob

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tained by him in any previous year. The season there was very favorable, and in the fall there was an unusual abundance of buckwheat pasturage in his neighborhood."—*Ed. American Bee Journal.*

Mrs. E. S. Tupper, of Brighton, Iowa, a noted Western writer on bee culture, says: "In the summer of 1863 I had but two Italian stocks to commence with. One of these stored one hundred and ten pounds of honey, besides giving me three artificial swarms; the other gave me two swarms and stored ninety-six pounds of honey; and all the swarms but one, partly filled several boxes each. I had, that same season, fifty-six colonies of common bees, all of which were divided, but not one of which stored a pound of honey, though in the same kind of hives and treated in a similar way with the Italians. That season it will be remembered was very poor.

"In the summer of 1864, I averaged from nine Italian colonies one hundred and nineteen pounds each. The greatest yield from one hive was as follows: one full swarm taken from it the fifteenth of May; honey taken in boxes through the season, one hundred and fifty-six pounds, besides four full frames from which to rear queens; the swarm from it stored eighty pounds in a cap, and on the fifteenth of July threw off a very large swarm, which filled its hive, and stored several pounds in boxes. Thus we have two hundred and thirty-six pounds of box honey, besides two extra large colonies, from a single hive, not reckoning the frames and partially filled boxes. I do not think a colony of the common bee ever did as much in the best season; if so, let us have the record."

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Having now had an experience of several years with Italian bees, spending much of our time in the apiary, rearing queens, we find them to possess the following points of superiority over the common black bee:

Their individual strength being greater, they fly with less fatigue and are more active and successful in defending their stores against both the moth-miller and robber bees. They gather honey—especially when other sources fail—from iron weed, thistle and other flowers which are seldom visited by the black bees, working quite freely upon the seed crop of red clover, when other late forage is cut short by drought. They also work more steadily during the season, even when there is but little honey to be gathered from any source, and it being a well known fact that breeding keeps pace with honey gathering, the result is, strong stocks, which secure a large product of honey, and are proof against the moth-worm and poor seasons. Hence the importance of the above peculiarities cannot easily be over estimated, and they account in part for the following characteristic differences between the two races of bees:

1st. The Italian queens are called "prolific breeders," as the stocks breed earlier in the season and continue later, casting larger swarms and swarming on an average about two weeks earlier than the black bee, thereby gaining that much time in the best of the gathering season, and usually swarming in seasons when common bees do not.

2d. They gather much larger stores of honey than the black bees, as proven by the united testimony of eminent apiarians both in Europe and America.

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3d. In opening a hive, the Italians, when *pure*, are much more peaceable than the black bees, and the queen is more readily found, not so much on account of contrast in color as from the fact that with the workers she usually remains undisturbed upon the combs.

4th. Being more constant workers, the Italians are less inclined to rob than the native bees. Being hardier, they are longer lived, winter more safely, and are more inclined to supercede their queens when past their prime. Hence, colonies are not so liable to become queenless, and queenless stocks do not so rapidly become depopulated.

5th. Their beauty of color and graceful form render them an object of interest to every person of taste. Hence, they attract many visitors, who admire their golden hue so beautifully shown by the sun's rays, as they pass swiftly to and from the hive.

CHANGING A STOCK OF COMMON BEES TO ITALIANS.

To Italianize a colony of black bees, it is only necessary to remove the native queen and substitute in her place a fertile Italian queen. The Italian queen will commence laying almost immediately, her progeny beginning to hatch in about three weeks, and in from three to six months the whole stock will be pure Italian. The native queen is most easily found by opening the hive near the middle of a clear day, when many bees are absent in the fields. Handle the combs carefully, looking over one at a time, using the smoke sparingly lest the queen be driven from the combs. It may sometimes be necessary to shake

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the bees upon a sheet, that the queen may be seen and destroyed as she crawls toward the hive. If the Italian queen was obtained from a distance, the box in which she was shipped should be opened before a window, in a closed room, that the queen be not lost should she fly from the box. When introducing a choice queen, we should run no risk of having her stung by the bees; she must therefore be confined in a small wire-cloth cage, which should be immediately inserted near the centre of one of the brood combs, where the bees will cluster upon it, feeding the queen and keeping her warm. A drop of honey placed within her reach can do no harm. At the end of thirty-six hours, she should be liberated, smeared with honey, and allowed to crawl down among the bees.

Another method is to remove the native queen, and if near the swarming season, look for queen cells and destroy them if any are found. The stock is now allowed to stand queenless for about ten days. Open the hive on the tenth day, at the farthest, and cut off *all* the queen cells, for if longer neglected a queen might hatch which would have to be hunted up and destroyed. The bees being now without eggs or young larvæ, will give up all hopes of rearing a queen, and the Italian may be safely introduced as before directed. In all cases the queen should be well smeared with honey before she is allowed to go among the bees, as while cleaning off the honey they have no disposition to sting, and having time to discover her *rank*, receive her kindly.

In the proper seasons a populous stock may be divided (page 63) and an Italian queen caged and given to the queenless part.

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or a swarm may be driven from a strong stock in the box hive, as directed on page 60, and after returning the native queen to the parent stock, the Italian queen may be introduced to the swarm in the new hive. Again, a queen may be given to a natural swarm after hunting out the black queen. If another Italian queen cannot be had, the black queen should be returned to the parent stock.

ITALIANIZING A WHOLE APIARY.

"*A man near Gotha, Germany, purchased two stands of Italian bees five years ago, and in the spring of 1866 had increased his number to twenty-five stands, not one queen of which had mated with the black drones, though hundreds of common colonies were within two miles of him. His secret is to keep his colonies always very strong, not aiming at a rapid increase, and making his swarms very early. The instinct of the Italians is to rear drones earlier than the other bee, and they rear brood much faster in the spring, so that it is safe to 'do' the swarming before the black drones appear, and thus secure the impregnation of your young queens by Italian drones.*"—PRAIRIE FARMER.

If the colonies are in box hives, transfer one or more strong stocks and obtain queens for them any time during the season from May to November. In order to commence with pure stock, the queens should be obtained from some reliable person, as almost every subterfuge is resorted to by unprincipled dealers to make the public believe that *they*, above all others, have the location for breeding pure Italians. Early the next spring, place drone comb near the centre of your Italian stocks, and feed them regularly to induce early breeding, and bring the drones forward several weeks before black drones appear. If your

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black bees are in common hives transfer them, putting the drone comb in the outside frames. Should you desire to Italianize stocks for neighbors, they may be brought to your yard and Italianized with your own. As soon as the Italian drones begin to hatch, form one or more strong nuclei from your best Italian stock to obtain a large number of queen-cells, as directed on pages 65, 66 and 67.

On the eighth day after forming the nuclei, examine to ascertain the number of queen-cells, and remove the black queens from about two-thirds as many stocks. Leave them thus over night to realize their loss, and then carefully insert a queen-cell among the brood in each stock. Mark the frames containing them and examine the next day, for if any are destroyed others must be inserted in their places. What queen-cells remain may be used for other stocks, except to leave one in each nuclei to hatch and become fertile to supply neighbors or to be used in swarming. This method is short, but requires close attention to prevent some stocks from rearing black queens or becoming queenless. The stocks will also be somewhat weakened by being deprived of a laying queen even for a short time at this season of the year. The process will seldom be so well managed but that a few black drones will be reared, hence if queens are not reared early the first season, some of them will be likely to mate with black drones, which will be known by some of their worker progeny having but two yellow bands and others none at all, while a part will have the three bands of the pure Italian. A few poorly marked in any stock should not condemn it, if there are any hybrid stocks in the yard, as bees from different

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colonies will mix to some extent; but the young bees should be examined when just hatching from the combs, to see if all have the three yellow bands. If any queens are found to have mated with black drones, it is safest to remove them as soon as other queens can be reared to take their places, for although they will produce pure Italian drones, yet should such a stock swarm or lose its queen, a queen would be reared (unless prevented) from her hybridized eggs whose drone progeny would be impure.

Another method preferred by some, is to Italianize all your own and your neighbors' stocks as far as practicable the first year. To do this, secure the construction of as many queen-cells as possible from the brood in the Italian stock, and insert one in each nucleus. Let the queens hatch and become fertile, paying no attention to what kind of drones they meet. When fertile introduce them to the parent stocks, and rear others the same way before swarming. These queens, having been fertilized by black drones, their *worker* progeny will be hybrids, but their drones will be pure. The next season, all the drones in the apiary being pure Italians, the work is half accomplished. Then rear another set of queens, one for each hive, from the original pure one, and there being none other but pure drones in the neighborhood, the young queens will seldom find black ones, especially if the apiary be large.

ITALIAN QUEEN REARING.

The superiority of Italian bees is becoming so generally known that there is a great and constantly increasing demand for queens; hence the necessity for plain practical directions that

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shall insure success in rearing them even by the inexperienced bee-keeper. We are aware that general rules have been given, and many nice things written, yet the practical part, upon which success depends, is understood by but few. We have already given directions for rearing queens to Italianize an apiary, but when desirous of engaging in their extensive propagation, the following course should be pursued. Having Italianized your own apiary, and all your neighbors' stocks within about three miles, you are fully prepared to commence the business of queen rearing.

SMALL BOXES FOR THE NUCLEI.

The small hives or nuclei boxes should be made about six inches square inside, and the same in depth below the rabbets, which should be three-fourths of an inch deep. The frames, four in number, are suspended upon these rabbets, their top bars being narrow, the same as the side and bottom bars. The movable cover should be an inch larger than the top of the box, and clamped to prevent warping. Listing, or strips of woolen cloth, should be tacked all around on the under side of the cover, near the edge, to fit upon the top of the box and confine the heat generated by the bees. Before nailing the box together, a rabbet, five-eighths deep and two inches wide, should be cut across the inside of the back, and a piece tacked on the lower edge to hold in the tin feed trough. One end of this rabbet must be filled up and the other end covered with a flap screwed to the outside of the hive.

This flap is to be turned to admit of drawing out and filling

NOTE.—We now use only large hives for queen rearing, having discarded the small boxes.

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the pan when necessary to feed, and when the bees are to be confined to the hive, turn the other end of the flap, which should have a hole in it covered with wire-cloth, to give ventilation. The boxes should be painted a variety of bright colors—some white, others red, blue, &c.—and scattered over the yard so that a young queen may easily distinguish her hive from any other near it. A cheap stand is made by nailing strips of board for posts to each corner of a bottom-board eighteen or twenty inches square. The posts should project eight inches below the bottom board, for legs, and two of them sixteen and two eighteen inches above it, laying on a board for shade. We make the small frames the proper size to fit four of them into one of the large frames, and thus obtain brood from any hive by filling the small frames with thin worker-comb, or sticking in small pieces and allowing the bees to build the combs. We prefer, however, to have one or more *breeding hives* made the same as the small hives, but long enough to hold sixteen of the small frames, and having several entrances along the front side.

HOW TO COMMENCE QUEEN REARING.

As soon as drones can be reared in the spring, break up the stock from which you wish to breed, and transfer the combs into the small frames, placing them on the old stand in one of the long breeding hives. Shake the bees upon a sheet near the entrance, and as fast as they enter and collect on the combs they may be lifted out and placed in the nuclei boxes, giving a frame of brood and one of honey to each, and filling the other two frames with empty comb.

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Each nucleus should have about one quart of bees, which must be closed in, laying a rough board on the top and turning the flap to give ventilation. To prevent them from returning to their old stand, they must remain closed in for about thirty-six hours, when the entrance should be opened at sunset, the venti lator turned, and the regular cover put on to retain the heat. If bees for the nuclei are taken from a natural swarm, or brought from the distance of a mile, they need only be confined until sunset. About three quarts of bees must be left with the old queen in the breeding hive, and it may be necessary to place upon it the cap of the old hive that the bees may recognize their old location and not enter other hives. If queen-cells are at hand, one should be inserted when forming each nucleus; but if none can be had, leave all the nuclei until the tenth day, when more nuclei may be formed and a queen-cell for each taken from those first formed, leaving but one in each nucleus. Examine the nuclei often after queen-cells are inserted, as some cells may be destroyed or prove worthless and others be needed in their places. As soon as any nucleus hatches its queen, one of its empty combs should be exchanged for a frame of brood in the maggot state from the breeding hive. This will stimulate the queen to make her excursion to meet the drones and *prevent the bees from following her*, in which case, unless discovered, they would be lost. The brood, if supplied often, will also keep up the strength of the nuclei. It will be found convenient to have a piece of slate or board attached to each nucleus upon which to record its condition. When a queen becomes fertile, it will be known by eggs being found in the brood combs.

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SHIPPING QUEENS.

The shipping box is made just large enough to admit one of the small frames. There should be an opening in one end of the box near the bottom, and a small hole in the top, each covered with wire-cloth to give ventilation. Two strips of wood should be tacked on each side of the frame to prevent injury to the queen in case the comb should become loosened in the frame. When there is a frame of honey in the nucleus from which a queen is to be shipped, it may be placed in the shipping box with the adhering bees, and the ends of the frame nailed fast to the box. If the queen was not upon this comb, lift out the one upon which she rests and stand its lower edge upon the top of the frame in the shipping box. Blow a little smoke gently upon the bees, which will induce those entering the box to commence humming, and the queen will soon enter with the rest. Now lay in a queen cage, fasten down the lid, and the box is ready to ship to the purchaser, who should have been warned a week before.

REMARKS.

Whenever there is a scarcity of honey in the flowers, it will be necessary to feed some of the nuclei, especially those having unfertile queens or young brood, and those constructing queen-cells. Also the breeding hives, as it is sometimes necessary to keep the bees continually building comb in order to induce the queen to rear much brood.

A regular supply of queen-cells may be had every five days by having two queenless stocks, and inserting in them alternately every fifth day, comb containing eggs and larvæ taken from any

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stock from which you may wish to breed. The queen-cells must be removed by the tenth day from the time the brood was inserted, lest a queen should hatch and destroy all the other cells in the hive. If the comb containing eggs and larvæ for queen-cells be new, more cells will be built. Before inserting it in the queenless stock it should be cut in strips an inch wide by three inches long. To insert one of these strips, make an opening in the comb three inches long by one inch deep, and directly under this cut out a piece two-and-a-half inches long by one inch deep, which will give room for lengthening down the cells, and also leave a shoulder to support each end of the strip. As fast as the cells are used other strips may be inserted in the same openings. A queen is seldom injured while caged if the wire-cloth be neither coarser nor finer than fifteen or twenty meshes to the inch. The cage is sometimes made by winding a piece of wire-cloth around the thumb and stopping the ends with corks, but we prefer them made about three-eighths of an inch deep, nailing the edges of the wire-cloth to a wooden bottom. When introducing a queen, the cage is sometimes suspended in the hive by a wire between two combs, but the safety of the queen is better secured by inserting the cage in a comb near the brood, with room above for the bees to hover upon it.

By making and keeping stocks queenless, and feeding them when necessary, drones are retained for fertilizing queens late in the fall. By inducing the bees in such stocks to cluster outside, either by contracting the space inside, or leaning a piece of comb filled with capped brood against the entrance, drones will collect to such hives by thousands.

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CHAPTER VI.

THE APIARY.

In selecting a site for an apiary, we prefer to have the ground descend slightly to the east or south. The hives should be protected in winter and spring from the prevailing winds, either by buildings, trees, fences or other breakwind. Although we prefer, when convenient, to have our hives front the east or south, it is of little consequence as far as the prosperity of the bees is concerned. The hives should be sheltered from the rays of the noonday sun, except in April and May, when much warmth is needed to promote breeding. Care should be taken not to place hives *against* old buildings or fences, which form a congenial harbor for bugs, spiders, ants and other insects. Each stock should have a separate stand, and there is no danger of getting the hives too far apart. It is most convenient to have the hives near the ground. From five to ten inches is high enough for stands if means are taken to keep down the grass and weeds. A cheap and good stand is made by taking two pieces of four inch scantling fifteen inches long, and nailing upon them a board twenty inches long by fifteen wide. If a higher stand be preferred, take, instead of the scantling, two pieces of joist two inches by six, or four pieces of board may be nailed

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together with a fifth one across the top, forming an inverted box. These stands being movable, the stocks are less liable to be crowded, and when most convenient may be placed in an orchard, as there should be low topped trees and shrubs near the hives, both for shade and for swarms to cluster upon. The hives should also be in full view from the most frequented part of the house, that swarms may be heard and seen as they rise, with the least possible trouble.

LARGE APIARIES.

In choosing a location for a large apiary, the pasturage afforded by the neighborhood should receive attention—such as white clover, orcharding, forest trees, &c. If this be satisfactory it will pay well to go to some expense in fitting up a bee yard. One hundred stocks conveniently arranged, will need little more attention than ten managed in the ordinary way. If the situation be a windy one, a yard should be enclosed for the purpose. Let the fence, especially on the north and west sides, be about seven feet high, and tight if practicable. This will not only be a great protection in winter, but will break off the cold raw winds of spring, and thus save the lives of thousands of industrious workers that would otherwise be blown to the ground and perish at the very threshhold of their homes. Stands should next be attended to. These should be a few feet away from the fence to give room for passing behind the hives. An excellent arrangement for stands is to set two rows of short posts, of some durable kind of wood, letting them project but four or five inches above the ground. Upon these, lay scantling

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or small timber, forming two parallel lines about fourteen inches apart. Cut bottom-boards twenty inches long by fifteen wide, and lay them across and on the top of the scantling, observing the proper spaces between the hives. Next, procure sawdust or spent tan, and fill up under the scantling and around the posts. This will effectually keep down the grass and weeds, keep the hives clean, and prevent the frost from heaving up the posts. A shed should also be erected over the hives, both for shade and shelter from storms. In whatever style this is put up, it should be but five or six feet high, and open all around, so as in no way to interfere with working around the hives. The roof need be but four or five feet wide, and should slope toward the front of the hives. If there be no water convenient, a supply should be furnished the bees during warm, dry weather. It should be pumped or poured into a shallow trough containing small stones or shavings, for the bees to alight on, and changed often.

BEE-HOUSES.

Of bee-houses we deem it hardly necessary to speak. They are regarded as unprofitable by our best apiarians. Some of the objections are, cost of construction, danger of crowding hives too close, and consequent loss of young queens when returning from their nuptial excursions, and lack of a free circulation of air in summer. Beside, they afford numerous crevices and lurking places for moths, spiders, roaches, and other "unclean birds."

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HOW TO PROCURE BEES TO STOCK AN APIARY.

First, by Purchasing Bees.

Old stocks in box hives may be purchased and transferred into movable-comb hives. We prefer those not over three or four years old, that have cast swarms (and with them their old queens) the year before, unless the black queens are soon to be destroyed, and the stocks Italianized.

Smoke and examine them. If in the spring, they will, of course, be less populous than in the fall, yet bees should be clustered between most of the combs. The combs should be free from mold, and are easier transferred if in broad sheets. The less drone comb the better, and the more honey there is, the more you will have left for the table after transferring. We have transferred stocks from large box hives, giving them an abundance of honey, beside leaving out enough to amount in value to the purchase price of the stock. But if stocks that are not to be transferred, have, in the spring, from twelve to twenty pounds of honey, they will usually swarm earlier and be more prosperous than heavier ones, as large quantities of honey, at this season, only take up room that should be occupied with young brood. Probably the best stocks to purchase, are second swarms of the year before, provided the hives are full or nearly full of comb. Such stocks have young queens, and the comb cells are the small size proper for rearing workers, as drone comb is seldom built during the first year of the queen's existence. But if your hives are left to be filled with new swarms, take first swarms by all means, being careful to get, if possible, those

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from hives that have swarmed the year before, as such will have vigorous queens but one year old. We could not advise the purchase of second swarms at the time of their issue, unless early and of fair size, for except in good seasons, many fail to secure sufficient stores for winter.

By selling rights and hives, and taking bees for pay, agents and owners of territory often get bees enough to stock an apiary without taking bees from any to whom they can sell for cash. Directions will be found under "Instructions to Agents and Owners of Territory."

By Taking Bees on Shares.

Bees are sometimes taken on shares for a term of years, the person taking them finding hives and getting half the increase and honey, or more, when transferred into movable-comb hives and Italianized.

By Capturing Fugitive Swarms.

We once bought twenty stocks, at five dollars each, of a man who got his start by finding a swarm hanging to a bush. Fugitive swarms may often be brought down by throwing dirt among the advance guards, or by getting in the proper position and reflecting the rays of the sun upon them from a looking-glass.

By a Safe Increase of Stocks.

After a few stocks have been obtained, by any of the foregoing methods, by far the cheapest way to stock an apiary, is to increase the number of stocks by nucleus swarming, and obtaining bees *gratis* of neighbors, by taking up their condemned

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stocks in the fall. Such swarms are taken home and supplied with frames of honey.

By using Surplus Honey Stored in Frames.

Our best apiarians all agree upon one thing, which is, that bees will store more honey in the body of the hive than they will in top boxes. For this reason, and the advantages in supplying needy stocks for winter, we prefer to have a part of the surplus stored in frames. Whenever honey is taken from the hive, it should be set into boxes or hives, and taken to a dark room and kept until fall, when some may be needed in preparing stocks for winter. Some should also be kept on hand for emergencies, and the rest may be sold or used in making new colonies with bees obtained

By Taking up Light Stocks for Neighbors.

There are enough in almost any community who are so far behind the age as to hive their late swarms in box hives without uniting them. These and other light stocks they brimstone in the fall, *unless* they can get the "bee man" to take them up for the bees. Every bee-keeper whose apiary is not fully stocked, and all who wish to make the most money out of their surplus honey, should prepare to take as many such swarms as they can supply with frames of honey to winter upon. The process of taking up a swarm is nearly the same as for transferring. Have a small box with a hole in each side covered with wire-cloth for ventilation. As each comb is taken out brush the bees to the entrance of the box, and when all are in close it up. As it does

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not pay to winter small swarms, we usually put two or more together, and if no queens were removed all but one will be killed. The empty combs are valuable to use in honey boxes and frames in the body of the hive, and may be purchased at the market price of beeswax. Fasten them into frames with melted rosin, and use them to fill out the hives after giving each swarm four or five combs of honey. If this be not done the space should be contracted by inserting a partition board or a frame with a cloth tacked upon it. Each swarm should also have some bee-bread, which may be got by exchanging with old stocks.

HUNTING WILD BEES.

We have known many persons to get a start by lining wild bees to their trees, which, if cut in spring or summer, the bees will do well. Transfer them with their combs into movable frames, the same as from a common hive. We have cut trees where the bees entered seventy or eighty feet from the ground, with no small timber to break their momentum in falling, and yet saved the swarms. After a tree has been cut and the swarm hived, bees from neighboring swarms will soon appear, to take charge of the waste honey, and if more wild swarms are in the vicinity, which is usually the case, they are easily followed home. By taking lines from the different trees as they are cut, several may often be found within the circuit of a half mile. Bees are found with the least trouble in February or March, when they fly out on the first warm days, and some becoming chilled fall upon the snow. Lines taken from buckwheat and other flowers should be carefully marked, and if not traced up

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at the time, may be found towards spring by the dead bees on the snow. When a tree is found, cut upon the bark, (in the least conspicuous place,) your initials, with date of finding, and let it stand until drones appear in May, when, if the queen should be killed in falling the tree, there will be eggs in the combs from which to rear another, and drones for her fertilization. When the bees are at work upon the flowers a line may be started by taking a plate or a piece of board, upon which is a small piece of comb filled with diluted honey. You will also need a glass tumbler and a piece of brown paper or dark colored cloth. Having found a bee upon a flower, place over it the tumbler and leave it inverted upon the cloth till the bee rises to the top. Wait till it quits buzzing, (that it may not get besmeared with the honey,) then carefully raise the tumbler and place it over the honey on the plate, wrapping the cloth around the upper part of the tumbler to darken it. The bee will descend toward the light, when, coming in contact with the honey it will commence loading up. Gently remove the tumbler while the bee is at work, and stepping back a few feet, place your eye near the ground. With the clear sky for a background it is easy to keep sight of the bee as it rises, describing several circles at first, then striking a "bee-line," for home. It soon returns with many others. When a strong line has got to work, cover the bees with the tumbler, and moving them along the line towards the tree again liberate them. Care must be taken not to go beyond the tree, else the bees may not return. If the tree is now supposed to be near, mark the line of bees by putting an assistant stick, in range, a few stakes. Again cover the bees

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upon the plate and carry them a few rods *away from the line* in order to get a *cross line.* Mark this also with stakes, then run out both lines by sticking more stakes, and the tree will be found where the lines meet. To find the place where the bees enter the tree, walk slowly backward and forward in its shadow so as to bring every point of its body and large branches in range between the eye and the sun. Look at the sides of the tree and outwardly, just below the sun, where the bees are easily seen and appear quite large from the reflection of the sun's rays upon their wings. A spy-glass is a great aid when the bees enter high up in the tree. In the fall or early spring, when the trees are bare of leaves, it is easiest following lines and finding the place of entrance in the tree. With a little honey or dissolved sugar for a *bait*—which, if not poured into comb, must contain some floating substance to keep the bees from drowning—lines are readily started from "sugar camps," or moist places, outlets of springs, &c., where the bees come for water. In the gathering season it is sometimes difficult to get bees to work upon the bait unless new honey be used, taken directly from the hive. The honey, if not very thin, must be diluted with water, else the bees may not leave directly for home. To attract the bees, choose the middle of a warm sunny day, and going into the edge of a field or other open place as near the supposed locality of the wild swarm as possible, burn a piece of dry comb or beeswax upon which a little oil of anise has been dropped. In half an hour or so the bees will come following along the line of smoke, where the bait should be placed, scented also with anise oil to aid the bees in finding it. The bees from the richest tree

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are not the most hungry, but fly cautiously and angrily about before alighting. If the bees are got properly to work, one or more swarms may often be found, which, if transferred into hives will be a valuable acquisition, but are too often thoughtlessly destroyed for their stores alone.

HOW TO TRAP WILD BEES OR ROBBERS.

We give this method more especially for pioneers in a new country, for although a *part* of a swarm or swarms of fugitive or wild bees may be easily trapped without finding the tree, by getting them to work upon a bait, yet if other bees are at work within reach *there is no way to prevent catching them also, even though they belong to your own or your neighbors' apiary.* After getting into the supposed vicinity of wild bees, and a mile or more from any apiary, get the bees at work upon a bait by either of the methods given. Remove the cap and frames from the American Hive and place in it the bait containing plenty of honey, with the bees upon it. Close the entrance, leaving open the two fly-holes above it. Set another hive upon the top of this one, having first bored a hole in its bottom for the bees to pass up through. This hole may be covered with a slide to be worked through a hole in the side of the hive. The hive should also have wire-cloth tacked over its top and the cap left off, as in moving bees. After a strong line of bees have got at work, going and returning, close one of the fly-holes of the lower hive and insert in the other a tin tube about six inches long. The outer end of the tube should not project beyond the front board,

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and should fit the hole to exclude the light. The inner end reaching to the centre of the hive should have a valve of light wood or paper hung to its upper side to cover the end. Open the door to the observation glass, and when enough bees have crowded into the hive to cover the glass, close the door and allow them to pass into the upper hive, which should be prepared to receive a swarm with frames in place, honey for food, and comb with eggs, from which to rear a queen, unless a fertile queen can be given it, caged, as in nucleus swarming. The piece of comb with eggs may be brought in a small box, with bees to keep them warm until needed. As often as the bees become thick upon the observation glass, close the door and draw the slide from the hole above, when the bees seeing the light will ascend into the upper hive. Should the bees cease coming before a good swarm is taken, open the other fly-hole near the tube and let some out till a strong line is again formed, being careful to have the slide cover the hole in the bottom of the upper hive whenever light is admitted into the lower one. A moderate sized swarm may often be taken without using the upper hive. After removing the hive to the apiary, let it stand closed till half an hour before sunset on the third day, when the queen must be uncaged and the bees allowed to fly. If no queen were given them, the hive should be opened in about three weeks, and the drone comb removed from the centre, if there be time to collect stores for winter, otherwise it should be left till spring.

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MOVING BEES.

When moving stocks short distances, or only to different stands in the the same apiary, it should be done during a cold spell in winter or early spring, before the bees have fully taken their location.

If they are to be moved a mile or more, it may be done, with proper precautions, at any time of the year. The stocks to be moved should be prepared early in the morning or when the bees are not flying. To prepare a stock in a common hive, blow in a little smoke and carefully lifting the hive invert it upon the ground. Have ready four small strips of soft wood and a square piece of wire-cloth, or coarse cotton or linen, large enough to cover the mouth of the hive. Spread the cloth over the mouth of the hive, lay on the strips, and tack through the strips into the edges of the hive. These strips will save tacks and prevent the bees crowding out under the cloth. A sleigh, buggy, or spring wagon, is the best for moving bees, yet, with careful driving, they may be moved on a wagon without springs. Place the hives in the wagon upon a bed of straw, keeping them mouth up to secure ventilation, as bees need much air whenever disturbed. Beside, in this position the combs rest upon their attached portions and are less liable to break by jolting. If the weather be very warm use the wire-cloth to confine the bees, and keep the hives shaded from the sun. In most movable-comb hives, strips must be tacked across the frames to keep them from swinging together. To prepare a stock in the American Hive, simply remove the cap and tack the cloth or wire-

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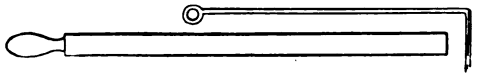
cloth over the top. Drive upon a walk. New swarms may be brought home in a box in the cool of the evening after their issue, but if hives are left for them, and they are allowed to start *new* combs, great care must be used, if moved before the combs are finished.

TRANSFERRING BEES AND COMBS FROM THE BOX HIVE.

The best time to transfer bees into the movable-comb hive, is from the appearance of the fruit-tree flowers until swarming. During this season, when the bees are gathering honey, the beginner may safely undertake the operation, as the bees will promptly repair the combs and often be more prosperous than before. They may be transferred earlier, if carefully done, or indeed at any time, if the brood is not chilled by exposure to the cool air. Yet nothing is gained by disturbing bees in cold weather, neither is it safe to transfer for three weeks after a stock has swarmed, in which time its queen will generally have become fertile. But when a second or third swarm can be hived, and set close to the old stock, it is then quite free from bees, and may be transferred with but little trouble, and the swarm jarred from its hive and united with the transferred stock, making a



13. Transferring tools. The hook is to loosen the combs from the top of the hive or gum, when the side is not pried off. The other is made of a piece of hoop-iron, (2 inches wide by 20 inches long) by grinding the end bevelling like a chisel, and is used to loosen the combs from the sides of the hive.

good job. Or when an Italian queen is to be introduced, six or seven days after a stock has cast a first swarm, the old stock may

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be transferred and all the queen-cells destroyed; when the stock is ready for the Italian queen. The tools needed, beside those shown in the cut, (fig. 13,) are a hammer and stout chisel for prying off one side of the hive, and a long-bladed knife for cutting out the combs.

OPERATION.

Prepare the frames in the new hive, by prying off most of the comb-guides, and letting down the cross-bars to suit the size of the combs. After smoking the stock to be transferred, invert it in the shade, and, keeping the bees down with your "smudge," cut out a small piece of comb, containing brood, to place in an empty box or hive upon the old stand. Also, if other stocks are close, partially cover them to keep out returning bees. Our common practice (if in warm weather) is to drum the bees from the stock to be transferred, proceeding the same as in driving out a swarm, (page 57,) until the bees have ascended into the drum box, when it is removed and a cloth tacked over it, and left mouth up in the cool shade until needed. We now remove the old hive into a sheltered place, or, if flowers are scarce and other swarms near by, into a shop, out-house, or upon a clean barn-floor. Now drive out the cross-sticks, and with the hoop-iron sever the attachments of comb from the side of the hive upon which the combs run nearest parallel and can be most easily removed. Pry off the side of the hive with the chisel, cutting the nails if necessary, and commence cutting out the combs. Have a box, half the width of the hive, in which fasten some drone brood, and place it upon the *opposite side* of the hive from

NOTE.—We have found it most convenient to use fine wire for fastening in the combs.

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which the combs are to be removed. The bees will gather into this as the work progresses. Lay a board upon a barrel, for a table, and upon this your transferring board, (18 inches long by 14 wide,) upon which two or three thicknesses of woolen cloth should be tacked. As each comb is cut out, brush off the straggling bees, lest they get besmeared, and lay it upon this cushion, and upon it your frame. Mark inside the frame, and trim off the comb in such a manner, that when fitted into the frame, it shall remain in about the same position (top edge up) that it occupied in the old hive, as many of the cells incline upward. Cut the comb a trifle large, and spring the frame over it. Fit in all pieces of good *worker comb*, even if old and black. Combs too thick to let the frames together, should be shaved off. The *drone comb* may be known by its large coarse cells, and unless placed in the upper part of the outside frames, should be rejected, by which a stock will often be rendered very prosperous that was no profit to its owner before. When transferred in the spring, no more honey need be put into the new hive than is necessary to secure all the worker comb, but if transferred late, plenty of honey should be given. As melted rosin or bits of tin are insufficient for fastening *heavy combs* into the frames, we use strips of wood, one-fourth of an inch thick by three-eighths wide. One of these slats is pushed under the comb, another laid on top, and the ends looped together with twine. Raise the end of the cushion-board, to bring the comb to an upright position, and set it into the new hive, which should be kept covered to exclude stranger bees. Care must be taken to place all combs containing brood or eggs, together in the centre, with the store

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combs next to the outside. If a comb be too weak to sustain its weight, it must be divided in the middle, and the upper half supported by a cross-piece tacked within the frame.

If the air be cool, the bees in the small box set upon the hive, will be needed to keep the brood warm in the new hive, and may be shaken into it when only two or three frames have been filled, but in warm weather, we usually transfer all the combs before hiving the bees. If there be much honey in the combs, it is well to place a shallow pan—made for the purpose—beneath the frames, to catch the drippings. If this be not done, clean off the bottom-board with a wet cloth. Cover the upward passages to keep the bees below, and bringing the drum box, shake the bees on a sheet at the entrance of the hive, (being careful not to jar the combs,) gently brushing them until all have entered. Keep the hive in a vertical position, and carry it steadily (without the cap) to the original stand. Blow a little smoke under the box left to hold the returning bees, and, if numerous, jar them upon a sheet in front of the hive. Replace the cap, contract the entrance, and shade the hive from the sun.

When the bees are gathering but little honey, and there is no out-building into which the stock may be taken after drumming out the bees, place a board upon a sheet, and upon it your drum box, and cut out all the combs before transferring them into the frames. As the combs are removed, one by one, brush off the bees upon the sheet, and let them enter the drum box, while an assistant immediately carries the comb into the house, placing it upon a few thicknesses of rags. As soon as the bees have entered the drum box, set it upon the original stand, and let it

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remain until the combs are transferred into the new hive. Then hive the bees as directed. In this way, there is little danger of robbers, or losing the queen, and the brood is not liable to be chilled in the warm room. Late in the season, when the bees are rich in stores, and consequently harder to control, the beginner may sprinkle a few grains of tobacco upon his rags for smoke, being careful to subdue the bees at the start. If the flowers are not yielding a supply, feed the scraps of honey to the stock the next morning, placing them in the chamber of the hive, as much honey is consumed in elaborating wax to repair the combs. In four or five days after the transfer, the temporary slats are to be removed, and any crooked comb straightened. For convenience, we fasten a permanent loop to one end of a slat, and a piece of wire to the other end. The other slat is left smooth, with one end slightly sharpened, to push under the comb when the looped slat is laid on, and the loop slipped over the sharpened end of the under one. Give a twist to the wire at the other end, and the comb is secured. The slats are removed by drawing the smooth one out of the loop, which loosens the other, and both are drawn out. These slats may be used many times over, and will last for years.

ROBBING.

Early in the spring when few flowers have appeared, and after they fail in the fall, or indeed in any time of scarcity, weak and queenless swarms are apt to be troubled by robbers. Yet the prudent bee-keeper, by caring for such stocks in time, will avoid the danger. When flowers are scarce, expose no sweets near

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the apiary while the bees are flying, as "prevention is better than cure." Robbers may be known by their buzzing around the hive in a very suspicious manner. Should one alight, he is hurled from the entrance and frequently receives the fatal sting As long as this state of things continues and the attacked colony is prompt in defending itself there is little danger, but should the robbers gather about the entrance in considerable numbers, they may be dispersed, for the time, by sprinkling with *cold water;* but if the attacked colony be very weak, or not discovered until resistance has ceased, it should be closed (ventilating well) and either taken from home until the danger is past, or carried to the cellar or a cool room, and fed diluted sweet for three or four days. When again placed upon the stand, the entrance should be carefully guarded. If a half inch block be placed upon each side of the entrance and a piece of lath or shingle laid across, robbers will be cautious about entering the shallow passage. A short board leaned against the front of the hive, is also an excellent protection. Should it happen that a powerful stock from a neighboring forest attacks a colony, remove it as before, and trap the robbers as directed for capturing wild bees. If the bees are in the American Hive, little trouble need be experienced, as they are assisted in repelling marauders by the inclined bottom board, and by using the small slide for weak stocks, the entrance is easily contracted to the admission of a single bee at a time.

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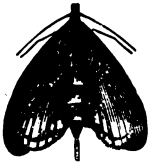
THE MOTH-MILLER.

We regard the fear entertained of the moth-miller as misdirected and more imaginary than real. As long as a stock is strong and in good condition it is safe, but should it be suffered to decline from over-swarming, loss of queen, or other cause, the eggs of the miller are allowed to hatch in the exposed combs, and as the bees die off from natural causes the moth-worms increase, and (if not dislodged) finally gain entire possession. The female miller is much larger than the male, and resembles in color a sliver from a weather beaten fence rail. During the day, she may often be found sticking about the cover of the hive. Toward evening, she will be flitting about the entrance, and if the combs are not covered with bees, or cracks and crevices can be found, or litter is retained on the bottom-board, she will be at no loss for a place to deposit her eggs within the hive. There can be no "moth-proof" hive; but if the entrance be on one side only, and the bottom-board is inclined, the bees have all the protection against these intruders that a hive can afford. *Moth-proof* hives (so called) are owned either by persons of little information, or sold to such by unprincipled venders, as well informed bee-keepers know how to prevent the ravages of the moth, and also know that in warm weather, more or less moth eggs are present in all the combs. Hence, a real moth-proof hive must also exclude the bees. During the summer months, if a mixture of vinegar and water, well



14. Female.

15. Male.

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sweetened, be placed at night among the hives, in white dishes, many millers will be drowned. Moth "traps" form the basis of a considerable trade. Some of these might be well enough if they were empted and the worms destroyed every week; but as they are usually neglected, they become "moth nurseries," instead of traps.

Worms may be trapped early in the season, by laying pieces of shingle or split elder, the hollowing side down, upon the bottom-board. The worms will retreat under these to spin their cocoons, and must be destroyed once or twice a week, or they "take unto themselves wings and fly away." The moth is less troublesome in large apiaries. The sprightly little wren, if encouraged to build its nest near the hives, will destroy myriads of worms and insects. They are easily attracted, by putting up boxes made three inches square, with an inch and a half hole for an entrance.

ANTS AND OTHER VERMIN.

Ants will frequently get into the chamber of the hive if not properly constructed, and whenever disturbed are very annoying to both the bees and the keeper. *To banish them from the hive* start them out with smoke and brush a little *spirits of turpentine* where they "most do congregate," and should they have a hillock near treat it a few times to *warm soapsuds*, and the ants will bid you a long adieu. If spirits of turpentine be not at hand, the leaves of catnip, tansy or black walnut, placed in their "retreats," will usually drive them away. Spiders often spin their webs about the hives and ensnare some bees. They should

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behunted out and destroyed. The large mother wasps appear singly early in the spring to start their nests, and each, if not prevented, is destined to be the parent of a *little swarm.* They often harass the bees, and should have no quarter. At the approach of winter, the mice may seek a nesting place in the warm hive. If there are holes large enough to admit them, they should be contracted or covered with wire-cloth.

TO PRESERVE HONEY COMBS FROM THE MOTH-WORM.

As long as honey combs remain under the protecting care of the bees, they are secure, but if removed from the hive in the heat of summer, the eggs of the moth already upon them will hatch, unless prevented, and finally destroy them. How the eggs get there, is a question. One theory is, that they are deposited by the miller upon the bottom-board and about the entrance, and occasionally adhering to the feet or legs of the bees, are thus carried among the combs. The other is, that the miller is allowed at times to visit every part of the hive. One thing is certain. If in summer, we drive out all the bees and close the hive to exclude the miller, hundreds of worms will be developed, in from one to three weeks, acording to the temperature. The same is sometimes true of honey in the surplus boxes, though in a lesser degree. When removed early in the season, if to be kept in the boxes, it should be noticed frequently, and if small lines of a fine white powder are seen upon any of the combs, expose them to the fumes of brimstone. To do this, prepare a match by dipping the end of a cotton rag into melted

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brimstone, and when no arrangement for smoking has been made in the honey room, take a store box or flour barrel, and leaving a cavity at the lower end to receive the match, put in the boxes in such a manner that the smoke can enter them, and cover the top to confine the smoke. When separated from the combs by straining, honey is secure from the moth, its food being wax, and not honey. Strained honey may be kept from graining, by heating to the boiling point, (setting the vessel in boiling water, to prevent burning,) and keeping it in a dark room. Empty combs, unless the moth eggs have been destroyed by freezing, should be examined occasionally, and if traces of worms can be seen, smoke them also, being careful afterwards that millers do not get to them.

WINTERING BEES.

In regions where the ice garb of winter remains unbroken from fall till spring, the consumption of food may be lessened, and the safety of light stocks better secured by wintering them in dry cellars, or even in houses. But in this changeable climate, where the bees are frequently aroused to activity by summer weather in the middle of winter, and impelled to fly out to discharge their feces, it is not so necessary to guard against cold, as it is against the great consumption of honey in warm weather, or the filth and disease caused by confining the bees where they can be affected by changes of temperature in the atmosphere. Hence, unless a *dark, dry* cellar can be had, the mass of bee-keepers at least, will succeed best by properly preparing their stocks, and leaving them upon their summer stands.

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WINTERING IN THE OPEN AIR.

In October, the exact condition of all the stocks should be ascertained, both as to their strength, and their supply of stores for winter. If any are found lacking in both these points, join two together, or strengthen them with bees obtained from neighbors, (page 88,) and supply them with extra food. To ensure the safety of the stocks, till flowers bloom in spring, each should have twenty-five pounds of honey. With a little practice, the amount of stores may be very nearly determined by inspection, or simply by removing the cap and lifting the hive from the stand. However, if the combs are more than one year old, there is much liability of being deceived, when judging by lifting or weighing the hive. The reasons are, that old combs are heavier than new, and often contain large quantities of bee-bread. Still, the experienced bee-keeper will seldom err in his estimate of winter supplies. Should any lack stores, give them reserved frames of sealed honey, or if this cannot be done, and other stocks are very heavy, exchange a frame with each. If the lower part of such combs are empty, they may be placed near the centre of the needy stocks, as there should be honey directly above the bees; but if full, place them a little to one side of the cluster, for the reason that bees need empty cells to winter in. The comb in each frame should have an inch hole cut through it, four or five inches from the top, to enable the bees, in extreme cold weather, to reach the stores in the outside combs without danger of freezing, by leaving the cluster to crawl around the edge of the frame.

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When there are cross-pieces, as in the improved comb-frame, the bees seldom fail to leave openings directly above the cross-pieces, which serve for winter passages. *Upward* ventilation should be provided for strong stocks, by covering the hole in the top of the frames with a piece of wire-cloth, and filling the basin or cavity above it with cut straw or fine shavings. This will absorb the moisture generated by the bees, thus keeping the combs dry and free from frost, while it permits the foul air to pass off so gradually that cold currents within the hive are avoided. Stocks standing in exposed situations, may be greatly benefited by enclosing the hives (except the entrances) with caps made of flags or rye straw, being careful to exclude the mice. Set up a broad board to shade the hive, and especially the entrance, during the middle part of the day. If this be done, the bees will seldom leave the hive when the air is cool enough to chill them. When a judicious method of swarming has been pursued, and the colonies properly cared for, they should be populous and well provisioned for winter, requiring little trouble in preparing, or risk in keeping them safely through till spring. Such stocks, if shielded from the piercing wintry winds, and properly ventilated, will pass a Siberian winter uninjured. Bees should not be disturbed during winter, except at the close of every long spell of cold weather; when, if the air be warm enough for them to fly without being chilled, open all the entrances to their full capacity, allowing the rays of the sun to strike the alighting board, when the bees will fly out, void their feces and return, without loss, to the hive.

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WINTERING BEES IN CELLARS.

The object of wintering bees in cellars, is to have them in a place of even temperature, and just cool enough to keep them in a state of inactivity, thereby saving many bees and greatly lessening the consumption of honey. A cellar for this purpose should be dry, and the hives raised from the floor, to guard against the combs becoming mouldy from excess of dampness. The cellar should be divided by a curtain or other partition, that no ray of light may reach the hives when the door is opened. The bees should not be taken in, until it is evident that winter has commenced in earnest. The hives, if numerous, may be placed upon shelves, one above another, and *strong stocks must have abundant upward ventilation.* If the stocks are in the movable-comb hive, this will be secured by leaving off the caps, and leaving open the passages through the top bars of the frames. Also, the ventilator below the bottom-board should be left unobstructed. A piece of wire-cloth, or thin muslin, fourteen by fifteen inches square, may be tacked on the *top* of the hive, to confine the bees, yet this would be unnecessary if the proper degree of temperature were always maintained, and the light carefully excluded. When the stocks are in common hives, four or five holes should be bored with an inch bit, through the top of the hive, and covered with wire cloth. Inch strips should then be laid upon the shelves, and the hives placed upon them in an *inverted* position. Weak stocks, with hives but partly filled with comb, need less ventilation. In mild weather the air may sometimes be cooled and purified by opening the door

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at night. The temperature should not be allowed to fall to the freezing point, yet forty or fifty stocks enclosed in small space, generate much heat, and may sometimes become uncomfortably warm, which will be known by the uneasy motions of the bees. They should be examined occasionally throughout the winter, to see that all is right, but disturbed as little as possible. As spring approaches, strong stocks become more uneasy, and should be taken to their summer stands during the first warm days of March, setting out a few stocks at a time, to avoid confusion by mixing, until each has marked its location.

FEEDING BEES.

If the directions given in this work are carefully followed, few stocks will require feeding. When light stocks are in the American hive, any boxes taken off late, and but partially filled, may be placed upon such hives, and there being large passages into the boxes from every comb in the hive, the bees readily take possession of honey thus given them, even in the coldest weather. But in common hives, or in hives having a honey-board between the frames and surplus boxes, a colony would starve in *cold weather*, with plenty of honey in the *chamber*. Yet, if it is desired to winter light stocks, and *all* the honey, either in frames or boxes, has been *imprudently* used or sold, the best feed that can be given them is strained honey, by pouring it into the combs, or allowing them to take it from shallow pans placed in the chamber of the hive. The feeding should be done early in October, that the cells may be sealed over, as far as possible, before cold weather, for unsealed liquid absorbs impuri-

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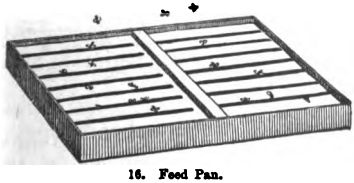
ties, dampens the air within the hive, and thus renders the bees unhealthy, often causing dysentery, whereby the combs are befouled with excrement. Honey is the most natural, and of course the best food for bees. West India honey can often be purchased quite low in our eastern cities, and if cleansed by heating, answers a good purpose. When the light stocks are in movable-comb hives, it is an excellent plan to remove two or three empty combs from each, and pour the honey directly into the cells, or if frames of empty comb are at hand, it is still more convenient to fill these and exchange with the needy stocks. When filling a comb, lay it upon a board or table, and drizzle warm honey over it in a fine stream, until the cells are about two-thirds full, leave it a short time to cool, then turn the comb and fill the other side. Only the upper half of the combs should be filled, and after placing them in the hive, feed in the chamber a few days till the cells are sealed over.



16. Feed Pan.

The tin feed-pan (fig. 16) may be five inches in width by eight in length, and one and one-fourth in depth, with perpendicular sides. To keep the bees from drowning, place in the pan pieces of empty comb, and pour the sweet upon them, or make a float, by fitting into the pan a light board, one-fourth of an inch thick, with one-fourth inch play all around. Nail a piece across the centre of this to prevent splitting, and with a coarsely set saw, slit the board many times from each end to the cross-piece. When the feed is first placed in the chamber,

NOTE.—We now use "Harrison's Bee-Feeder," which we prefer to anything we have ever seen. See last pages.

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uncover one or two holes in the top of the frames, and trail a little sweet from the pan to the edge of the holes, to get the bees started. After commencing, it is important to feed regularly every evening, and as fast as possible, or much sweet will be consumed in rearing brood, which feeding in this way always induces, hence the advantage of supplying it in combs in the body of the hive. Robbers must not be attracted by carelessly dropping the sweet upon the outside of the hive, and it is best either to remove the pan every morning, or feed no more at once than will be carried down through the night. *Nearly close* the entrance, and stop the holes in the ends of the cap, to prevent other bees scenting the feed. In winter, or early spring, light stocks in common hives, may be inverted, taken into a warm room, and fed by laying combs of honey or syrup upon the combs near the cluster of bees, or a feed pan or saucer may be fitted into the combs. Tie a cloth over the mouth of the hive to confine the bees. Half a pound or more of sweet will usually be taken down through the night, and the swarm may be carried to the stand in the morning. The feeding should be repeated once or twice a week.

Candy is excellent for feeding bees in winter and early spring. They would probably not subsist upon candy alone, for any great length of time, but if given before the honey is quite exhausted, it will greatly lengthen out their failing stores. As a pound will last a stock from four to six weeks, it is probably the cheapest feed known, and has the advantages of neither stimulating breeding nor robbery. Plain white candy is best, and may be laid across the tops of the frames, or pushed down among the

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bees, supplying about half a pound at a time. To feed a stock in a common hive, cut a hole through the top of the hive directly over the cluster, about three and a half inches square. Fit over this a box, without bottom or top, four inches square, closing the joint between box and hive, with paste or clay. Lay the candy loosely across the combs, covering the top with a woolen cloth, and upon this, a close fitting board weighed down with a brick, to prevent the escape of heat. Old thick honey, or honey in the comb, is conveniently fed in this way, or the combs may be hollowed out a little and a small sack, of open texture, containing a mixture of honey and sugar, may be introduced, thus saving colonies from starvation even in mid-winter.

If a colony is discovered, when most of the bees are apparently dead, they can usually be revived by sprinkling them with diluted sweets, and letting the hive stand a few hours, bottom up, in a warm room. We would feed in the spring, only to prevent starvation, and not to hasten breeding, except to obtain drones early for queen rearing, or in case of weak stocks, which may be built up by a systematic course of feeding. Feed needy stocks until fruit trees bloom. If honey cannot be had for this purpose, make a syrup, by dissolving two pounds of good brown sugar in a pint of water. This makes an excellent spring feed, and may be used sparingly in the fall, but if much is stored in the combs, it will sometimes sour or granulate and become worse than useless to the bees.

PROFITS OF BEE-KEEPING.

Bees are kept for profit, pleasure, or recreation; and as a means of promoting or regaining health. Unlike other live

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stock, they are self-supporting. They not only provide their own food, but with little care, will store a large surplus of their delicious product.

How much easier it is to give bees the little attention needed, than the trouble and expense of caring for cattle, pigs, and sheep, three times a day, which no good farmer complains of. It is indeed strange, that any person, occupying a rood of "mother earth," should neglect so rich a source of profitable enjoyment. Could our young men and young ladies, who now spend hours in idleness or vain amusements, be induced to purchase a swarm or two of bees, and give them the little attention needed, it would not only prove highly remunerative, but would lead them into habits of industry and thoughtfulness, and fit them for better citizens. By the introduction of improved hives, a fresh interest has been awakened in this branch of rural economy, and with honey at present prices, there would undoubtedly be a general rush into bee-keeping, were it not for the fear of stings, and a vague belief that "luck" has something to do with successful bee management. A little practical knowledge with regard to the nature of bees, will enable any one to obtain perfect control over them, and will also open his eyes to the fact, that, with properly constructed movable-comb hives, success in bee-keeping is not left to "luck" or "chance," but depends upon the observance of simple rules and regulations. With such hives, the bee-keeper is enabled to ascertain the exact condition of a stock at any time, and thus remedy defects, or easily remove any comb in the hive for any purpose whatever.

A few stocks of bees are often entirely neglected, and consequently less profitable, while a larger collection (needing little

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more care) receive proper attention; when the profits, as from farm products, will mainly depend upon the season.

"The intelligent, practical bee-keeper, can take care of five hundred swarms, and make a portion of the hives needed for new colonies."—*U. S. Patent Office Report.*

"The profits resulting from a judicious and proper system of bee culture, may be safely estimated at from one hundred to five hundred per cent. per annum. I have three swarms, which have paid me in honey and increase of stock, upwards of $100 in two years. The average profit upon my entire stock, for three years, has been three hundred and twenty-seven per cent. per annum, or $3.27 has been the annual profit on every dollar invested." —*Dr. Eddy.*

"On the 25th of April, 1858, I purchased ten hives of bees, in the old fashioned box hive, for $50. They were so full that I had to divide them before I could move them. I divided the ten, and made me twenty hives. On the thirteenth day after, I divided ten again. I took four queens from one hive, in the cells, and ten from another, and gave each swarm a queen-cell, which hatched the next day, making thirty hives. I sold from those thirty hives, $547 worth of honey, and the increase of my bees is worth $500 more, making $1,047 in one year, from an outlay of $50. I took from one hive, twelve frames filled with honey, in fourteen days, and I had a number of hives from which I took twelve frames, filled with honey, in twenty-one days."— *E. Townly, Cincinnati, O.*

The "American Agriculturist" gives the results of the apiary of Bidwell Brothers, of Minnesota, for two years past. In

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1864, their apiary consisted of one Italian, and fifty-eight stocks of black bees. The one Italian stock was increased to fifteen, and the fifty-eight stocks of black bees to one hundred and eighty-one, principally by artificial swarming, and averaged 42½ pounds box honey per stock; while, for the past season, from two hundred and four old stocks they received, on an average, a trifle over seventy-five pounds surplus honey per stock.

"A. Kearns, of Grundy County, started in this business, with a single swarm in an "old gum" owned by a neighbor, of whom he received half the proceeds for keeping them. One hive, one year old, filled three boxes that weighed as follows: one 34½, one 35¼, and one 36½ pounds, boxes and honey together, and the fourth partly full. This bee business is of growing importance. As soon as these discoveries are thoroughly known, bee raising will become as general as any other branch of production. When men learn that it is just about as cheap to raise honey as not to raise it, and far cheaper than to buy it, they will no longer avoid the business."—*Prairie Farmer.*

Let a person estimate the profits of bee-keeping, by commencing with a few stocks, and on an average, doubling every year, or putting the yearly average of surplus honey per stock very low, compute the interest accruing from capital invested in bees, and consider how easy it is to accumulate such capital, with the fact that constant attention is never required, and that hives will last almost a lifetime, he will not be surprised to find the most intelligent men in this country and Europe, turning their attention to apiarian pursuits.

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MONTHLY MANAGEMENT, OR SUMMARY FOR THE YEAR.

"What is termed 'luck' with bees, is only another name for careful and skillful management."—RURAL REGISTER.

Management for January.

If the weather be such as to induce bees to fly out often, much more honey will be consumed than when they remain quiet. Yet the first really warm day should be improved by removing the shade from before the hives, enlarging the entrances and brushing the litter from the bottom-boards. Scatter some loose straw in front of the hives to prevent the bees becoming chilled by alighting on the snow. If stocks were not properly prepared for winter, it may be done now. (Page 107.) *Strong* colonies need plenty of air, or water and frost may collect within the hive and destroy the bees. Stocks in common hives are often smothered by the entrance becoming closed with ice, snow or dead bees.

February.

Any needy stocks in common hives, may be supplied with candy or honey. (Page 112.) If in movable-comb hives, give them frames of honey taken from heavy stocks. Keep the air passages free from all obstructions. If bees are to be moved short distances, do it now. (Page 94.) The chief value of unbolted flour depends upon its being given early, before natural pollen can be had. If deferred till late the bees may not accept it. (Page 46.)

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March.

This month will afford the bees frequent opportunities to fly. Regulate the entrances according to the strength of the colony, and keep them shaded in cool weather or when there is light snow upon the ground. (Page 108.) Brush off the bottom-boards. Continue the *flour feed* as a substitute for pollen. (Page 46.) Mr. Quinby says: "One apiary fed last spring what would amount to an average of about two lbs. to the hive, swarmed three weeks earlier, and sent out three times as many swarms as any other in this vicinity. The result must be attributed either to the feed or to the superiority of the 'long billed' variety, (Italians,) to which it was given."

April.

Remove the absorbing material from over the bees and cover the openings in the top bars, to confine the heat and promote breeding. If old hives need repairing or cleaning, remove the bees and combs into new ones. Leave out drone comb. (Page 54.) A stock without brood at this season is probably queenless. (Page 32.) Build up weak stocks by feeding (page 110) or by uniting them with those that are queenless. (Page 32.) Should a weak stock be nearly overcome by robbers, sprinkle flour upon them, and if they are found to belong to a strong stock it may exchange places with the weak one. During this month and next raise common hives early in the morning and destroy the moth-worm, as one escaping now may breed a progeny of hundreds by autumn. (Page 103.) In these examinations look for immature bees upon the bottom-

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board. (Page 32.) Feed needy stocks honey or syrup till flowers become plenty. (Page 110.) Put up boxes for wrens. (Page 104.) Transfer bees into movable-comb hives, being careful not to chill the brood. (Page 95.)

May.

The colonies are now steadily and rapidly growing strong, and will usually make a start in the boxes before swarming. Remember the guide combs. Dip one edge in melted beeswax and stick it fast in the top of the box before cooling. (Page 51.) Remove the entrance slide from good stocks, if not done before. Continue to destroy the moth-worm. (Page 104.) Should a queenless colony be discovered at this season, a queen may be introduced from another stock, and that allowed to construct queen cells, which may be used. As soon as drones have made their appearance, steps may be taken to secure the construction of queen-cells for nucleus swarming. (Page 65.) Strong stocks, especially Italians, often swarm towards the last of this mouth.

June.

If natural swarming be permitted, the close and prolonged attention of the bee-keeper is now demanded. If an Italian queen is to be introduced, she may be caged and given to a first swarm after hunting out its queen and returning her to the *parent stock*, or given to the parent stock if in a frame hive. Prevent over-swarming by removing queen-cells. (Page 28.)

Give the bees the shortest road to the honey boxes by opening the fly-holes. Give boxes to swarms as soon as the hives

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are quite full of comb, except near the close of the season. If a stock in a movable-comb hive seems less prosperous than its neighbors, the cause should be sought for and removed. (Page 54.) Place sweetened water in shallow white dishes among the hives to ensnare millers. (Page 104.) Sow buckwheat and furnish your neighbors with seed. (Page 44.)

July.

To secure the greatest quantity of pure white combs, remove the honey boxes as fast as filled. (Page 51.) A few days' neglect may greatly reduce the amount of surplus. To induce the bees to commence quickly in the second set of boxes, put in large guide combs or elevate the full boxes. (Page 129.) After removing honey from the hive keep it in a dry cool place. If kept in a damp cellar it becomes thin and sometimes sours. The boxes should stand the same side up that they did on the hive, with paper or cloth pasted over the holes to exclude insects. (Page 51.) Aid weak colonies by killing all worms found about them, and strengthen them by occasionally exchanging with a strong stock for a comb of brood nearly mature. Should the yield of honey be very great, a populous colony will frequently store its combs so full as almost to put a stop to breeding, when the bees will cluster idly about the entrance. They may be aroused to action by giving them an empty frame, or frames of empty comb placed near the centre of the hive, by removing the others outward. See that the hives are shaded from the sun. (Page 84.)

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August.

Opening hives or removing surplus honey, should now be done early in the morning, after sunset, or on a cool day, exposing the honey as little as possible to tempt the bees. Boxes nearly filled with clover honey may be removed before buckwheat honey, which is darker, is stored with it. If any stock remain queenless, (page 31,) divide any buckwheat swarm that may issue, and give it the half containing the queen, returning the other half to the parent stock, or any small colony or nucleus may be united to the queenless stock. (Page 33.) Buckwheat swarms are easily made good for winter by giving them frames of honey or empty comb. (Page 90.) If wild bees are in the vicinity, line them from fields of buckwheat. (Page 91.) When the flowers begin to fail, is the time of greatest danger from robbing; avoid it by taking care of colonies too weak to defend themselves. (Pages 33, 102.) The beginner, if fearful, may wear a bee hat (page 38) or carry a smoke in the hand when about the stocks, blowing a little into any near by, if irritable. When rags for smoke are not at hand dry rotten-wood may be used, and is an excellent substitute. (Page 37.) If not already done, the bee-keeper may Italianize common stocks during this and the fall months.

September.

Bees now find scanty pasturage, except in sections where golden-rod and other late flowers abound. Should any young swarm be deficient in bee-bread, exchange a comb or two with an old stock that has an excess. (Page 107.) If a colony

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retain its drones long after those of other stocks are destroyed, it will almost invariably be found queenless. Graduate the entrances of weak stocks, and be careful about exposing refuse honey or other sweets to demoralize the bees. (Page 101.)

October.

When taking honey to market let the boxes ride bottom upward, as there is less danger of breaking the combs. Weak colonies may be strengthened or new ones formed by taking up light stocks for neighbors. (Page 90.) Otherwise unite the weak colonies, and if any need feeding, it should be done now. (Page 110.)

November.

When the apiary has received seasonable attention, little more remains to be done than to prepare the stocks for winter. (Page 107.) Light colonies may still be supplied with frames of honey, or united with little trouble in pleasant weather. (Page 33.) They will not quarrel now, and few will leave the combs if carefully handled.

December.

See that the hives are protected from the wind, and the entrances from the direct rays of the sun. (Page 108.) Strong colonies need almost as much air in winter as in summer, hence, such will seldom need the entrance slide except in winter, and not then if the upward ventilation has been neglected.

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CHAPTER VII.

HIVES.

THE value of a hive depends upon its size, shape, and the advantages secured in its construction.

SIZE.

Experience has demonstrated that, as a general rule, when we vary from the correct size, the larger the hive the fewer swarms we get, and the smaller the hive, the smaller the swarms will be, and the greater the danger of over-swarming. A hive should contain about two thousand cubic inches, in the clear. A stock in a hive of this size, will swarm more regularly than from a larger one, and store more surplus honey. While, if the hive be much smaller, the colony will often fail to lay up provisions enough for our long winters. All the hives should be made of the same size, as a very large swarm will usually be no larger, after a few months, than one of medium size, while a small swarm may be as large as any at the end of the season, much depending upon its having a prolific queen, good weather and abundant pasturage.

SHAPE.

Upon the shape of the hive, depends the economy of heat for breeding, and safety in wintering. If a hive of proper size be

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too high, less box honey is obtained; but if too shallow, it not only takes more workers to cover the lower part of the combs, to protect them from the moth, and keep up the required heat for breeding, but the winter stores are scattered over so large a surface, and of so little depth, that although the heat arising from the swarm will keep the honey warm directly above the bees, they soon consume that to the top of the hive. When this happens in very cold weather, if there are no holes through the combs, the bees die of starvation, as it is certain death for them to venture around the edge of the frosty combs by which they are surrounded. Hence, swarms often perish with ample stores in the hive. For a correct proportion, the common hive should be square, and its breadth equal to three-fourths of its height inside. And in movable-comb hives, the depth of the frame should be greater than its width, and this should not be less than the distance from one side of the hive to the other, across the frames, as the outside combs better confine the heat than the edges of the frames. But extensive bee-keepers, who winter their bees in cellars, may, if desired, safely make the hives for their own use more shallow.

"THE ADVANTAGES SECURED IN THE CONSTRUCTION OF HIVES."

Centuries ago, intelligent men were convinced that, if *complete control of the bees and combs* could be obtained, bee-keeping must become a sure and systematized business, both pleasant and profitable. The practice of murdering whole colonies, with the brimstone match, for their stores, was gradually abandoned by the introduction of surplus honey boxes, with glass sides in

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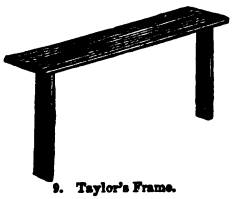
which the bees would store their tempting sweets in the most beautiful and marketable form. Yet bee culture still bore the stigma of a business of "*luck and chance*," or *working in the dark*, and all attempts at improvement were failures, as there were no facilities for examining the interior of the hive to learn the cause of or apply a remedy for any defect that might there exist. But "necessity is the mother of invention." This darkness was first gradually dispelled, in Europe, by the invention of a movable-comb hive, called the "Leaf Hive," by Francis Huber, of Geneva, as early as 1795.

It had long been known, that bees would start and build their combs with considerable regularity from strips placed across the top of the hive, by which the combs could be lifted out by cutting loose their side attachments from the hive. These "bars" led to "bar frames," which are most briefly described in Mr. Langstroth's Patent, referred to in note on page 140, in which he shows that he is the inventor of the shallow chamber and some other features connected therewith, which will be understood by the descriptions which he gives of previous inventions, which we abbreviate as follows: The Huber frame consisted of sections, the top and side bars fitting close together, with no honey receptacles above, but the necessity of cutting the side attachments of the comb was obviated.



9. Taylor's Frame.

W. Augustus Munn, Esq., invented the "bar and frame hive," and published a description of it in London, in 1844. In 1851, he published a second edition of his pamphlet, in which, describing his "improved hive," he says he has "very materially

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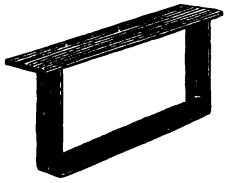
simplified the construction of the bar and frame hive, by forming the oblong bar-frames into triangular frames, and making them *lift out at the top* instead of the back of the bee-box." M. Debeauvoy published the second edition of his "Guide del Apiculteur," as early as 1847, in which he describes his movable frames with narrow tops and side bars, the tops fitting closely to the honey-board above, and the sides to the walls of the hive. In 1851, he published his third edition in Paris, in which he describes his new frames, having their sides at suitable distances from the bottom and walls of the hive, with the tops fitting closely together, but still in connection with a honey-board above the top bars. Thus, movable-comb frames were much improved and used in many parts of Europe, by Huber, Debeauvoy, Munn, Taylor, Bevan, Golding, Huish, Dzierzon and others, while the "brimstone match" bore sway in America. But, the key to successful bee-keeping once found, nothing could stop its progress. The bounds of the Atlantic were passed, and many in our country became acquainted with Huber's "Leaf Hive" and movable-comb system.



10. Oblong Munn Frame.

THE MANNER OF REMOVING THE FRAMES.

Hives, in which the frames must be lifted out at the top, are necessarily very shallow, to facilitate the removal of the frames, and lessen the danger of their swinging together at the bottom. Mr. Langstroth, although preferring deeper frames, if his objections could be overcome, gives the following reasons for having

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his frames shallow. He says, "the deeper the frames, the more difficult it is to make them hang true upon the rabbets, and the greater the difficulty of handling them without crushing the bees or breaking the combs." The manner of removing the frames from the American Hive, will be understood by the following description.

THE AMERICAN BEE HIVE.

The culture of the honey-bee has engaged the attention of intelligent and enterprising men of all ages, yet, within a few years, by the introduction of improved movable frames, old systems have been abandoned, and the pursuit of bee-keeping—*always attractive*—has been rendered a safe and profitable business. In shape and depth of comb, the American Side-Opening Hive closely resembles the common box hive. In the engraving, the bottom-board, A, projects in front of the hive, making a convenient alighting-board, and being inclined, is kept clean by the bees during the working season. By removing the entrance-block, C, a large opening is made for brushing out litter in winter or early spring, and for hiving new swarms. By the use of the small slide, B, held in place by the same button, the entrance can be contracted, if necessary, to the admission of a

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single bee, thus effectually guarding a weak swarm from robbery, and the entrance may be closed entirely by making the notches *d*, *d*, in the slide, correspond with the pillars, C, C.

The large observation glass in the back of the hive, gives a view of all the combs, and is covered by the door, F, which is hung to the clamp above, and cannot tighten by damp weather This is convenient for noting the progress of new swarms in building comb, and for visitors to see the bees at work. It will also reveal the strength of the stock or show when it is necessary to examine the combs, and toward spring, the amount of honey on hand may be judged of by the hight the bees have ascended in consuming their stores

The cap, (forming a perfect roof,) is made large enough to fit loosely over the hive, and being supported by strips fastened upon its inside, excludes water and insects, and is easily removed without jar. The movable side, *f*, is inserted from above into the rabbets, *a*, *a*, and is held in place by buttons, and by the notched clamp, *k*. The hive is so constructed as to be firmly clamped on all sides, and will not warp, though exposed to the direct rays of the summer sun. The movable side being slightly shortened at the bottom, no bees are crushed in closing the hive. By thus opening the hive at the side, honey for the table, or frames of honey and brood to strengthen weak stocks, are easily removed without injuring the combs, or irritating the bees, as in lifting them out at the top of the hive. The double projections on the frames prevent them from swinging together, and hold them at an exact distance from each other, and from the walls of the hive, leaving no place in the hive in which

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moths may deposit their eggs where they cannot be reached and removed by the bees. The arrangement of the central bars not only aid in securing straight combs, but the bees almost invariably leave holes through the combs just above the bar, which serve for winter passages, and save the trouble of inserting in the combs, coiled shavings or tins, as usually recommended but which bee-keepers generally neglect to do. The object of leaving a cavity above the frames, is not only to give room for the honey boxes without injuring the appearance of the hive by a high cap, but mainly to form a basin which (after the honey-boxes are removed and the openings from below covered with a piece of screening,) serves to hold in place cut straw or shavings, to absorb the moisture arising from the bees in winter, thus keeping the interior of the hive dry and free from frost. *A swarm of proper size thus prepared, will not perish while there is honey in the hive.* In moving bees the cap is left off, and a piece of wire screening tacked over the top of the hive. By thus leaving a large space between the screening and the top of the frames, the bees remain upon the combs, leaving a free upward ventilation, and can be moved or shipped almost any distance with safety.

IMPROVEMENTS.

The hive embodies two series of improvements. The first was the result of the inventive skill of several persons whose inventions were purchased and combined in this hive, and secured by letters patent, Nov. 24, 1863. The last series of improvements, including our improved movable-comb frame, pat-

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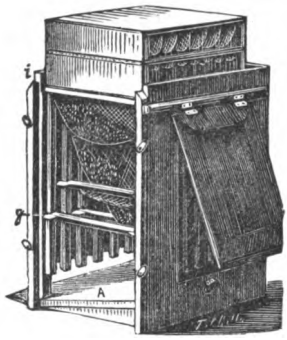
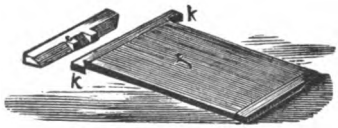
ented Oct 10, 1865, originated from a discovery deduced from carefully-conducted experiments, which seems destined to revolu



tionize all other systems of bee keeping. This discovery clearly reveals the *cause* of the imperfection which has heretofore existed in all movable-comb hives, (our own not excepted.) But our latest improvements completely remedy these defects, and, considering the past popularity of the hive, place its future supremacy beyond question. It could hardly be expected that perfection would be reached in the first movable-comb hive invented in this country. On the contrary, we have demonstrated by close observation and careful experiment that the very point *now* claimed by the inventor, viz.: the shallow space between and above the top-bars of the frames, is the direct cause of a great waste of animal heat, requiring an increased consumption of honey in winter, besides retarding early breeding in spring, and frequently entirely preventing a commencement being made in the surplus honey boxes. The importance of obviating these defects, will be understood, when we consider:



1st. That a stock of bees is often lost in winter or early spring, for want of a very few pounds of honey.

NOTE.—We have discontinued the use of large surplus honey boxes, and now use small ones, with glass sides and ends, as honey in these small boxes sells most readily in the city markets. Our new style of hive, No. 1, has 12 such boxes, and

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2d. That the best honey harvest comes early, and is comparatively of short duration; hence, the ability of stocks to cast early swarms, and gather large quantities of surplus honey, depends upon their rearing thousands of workers early in the season.

3d. A new swarm will often fill its hive in one or two weeks, and could store much more as well as not, could the bees be induced to commence and continue working in the honey-boxes.

These advantages are gained by so constructing the frames that their top-bars form a chamber floor, with openings across the centre, through which the warm air from below passes directly into the honey-boxes, as a high temperature is requisite for comb-building. The bees having no great distance to travel, or air space to cross to reach the boxes, readily ascend into them from any comb in the hive. The difficulty so often experienced in getting the bees to commence in an empty box after a full one has been removed, is entirely overcome by using a double tier of boxes. Several small boxes may be used, or if but two, each should be large enough to cover the top of the hive. The bees are admitted into the lower box first, and when they have sealed up most of the cells, raise it up, bees and all, (blowing under smoke,) and place the empty box with long opening through its top, directly under it, thus compelling the bees to pass through the empty box while finishing up the full one. By the time the upper box is finished, the lower one will usually be one-half or two-thirds full. The upper box may now be removed without the least interruption to the labors of the bees. When the lower box is ready to raise, place an empty one beneath it

the large hive, No. 2, 16—12 above and 4 in a side case; or it can be used with 10 frames below and 10 in a case above, and the honey emptied with an Extractor.

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as before, and so continue as long as the honey season lasts. As it is not necessary to open the hive to examine or remove boxes, these improvements enable the beginner and the timid, to manage bees with great satisfaction and success, obtaining good early swarms and much surplus honey.

MAKING HIVES.

The cheap style of the American Hive, made (as most movable-comb hives) without the large observation glass, is probably the cheapest movable-comb hive in use. Only about twenty-five feet of lumber are used in its construction, and being nearly the shape of the common box hive, boards the usual width are used, requiring no matching, which enables a good mechanic to make two or three of this style by hand per day. The boards may be planed and the hives painted and clouded, or left rough and coated with cement paint.

The following receipt is taken from the *Bienen-Zeitung*: "Two parts of fine sand well sifted, one part of best hydraulic cement, one of buttermilk and one of curd, from which the whey has been well expressed. Mix thoroughly and stir repeatedly to prevent hardening. Apply immediately with a common paint brush and add a second coat in half an hour. In two or three days, if dry, give the hives a thin coat of oil, to which any desirable shade of color may be given.

THE BEST HIVES.

The form and general appearance of the hive are such that it is easily rendered very ornamental, by inserting the 9 by 12

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observation glass; making the honey-boxes with glass sides and clouding the hive to resemble marble. We make no other style, as the advantages of the observation glass are so great, and the extra work trifling, especially where machinery is used, with which most of our factories are supplied. A good hand will cut up lumber for over one hundred hives per week, or nail together one-fourth the number ready for painting. The exact cost in any part of the country, will depend upon the cost of material and labor, and the experience and speed of the hand in using machinery. Our present foreman, with the aid of a rabbetting head and a set of holders, cuts up double the number he formerly did. We send a minute description for making hives, as per price list.

PAINTING AND CLOUDING HIVES.

Hives should be painted as soon as made, and three or four weeks before being used, as the smell of fresh paint is offensive to the bees. They may be painted every shade of color, for the sake of variety, but red is most apt to be noticed from a distance, while white or clouded looks best near by. To cloud a hive, paint it white, and while the last coat is fresh, place the hive in a horizontal position, passing under it the smoke and blaze of a lamp, with small wick. If the clouding be done in a room out of the wind, with a little practice the hives may be made to resemble marble, and are very ornamental, although it costs nothing for material and can be done in five minutes.

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LETTERING HIVES.

The hives are tastefully lettered with little trouble, by laying them down front side up, placing upon them a copper lettering plate, and applying a *very* little *thick* black paint. Some of the paint already mixed, may be darkened with lamp-black and applied with a common shoe-brush. Metal lettering plates are expensive, yet hives sell better to be lettered, and as the law is strict in regard to stamping patented articles, we will furnish lettering plates cut from paste-board, which if kept dry and carefully used, will last for years.*

MANUFACTURING ESTABLISHMENTS.

Our invitation, given in 1865, to open a correspondence with owners of planing mills where lumber is plenty, for the manufacture and sale of hives on liberal terms, has already resulted in the establishment of many factories, East, South and West, and we hope the arrangement will soon become so general that all orders sent us can be filled from factories so near the residence of the purchaser that the expense of shipping will be trifling, and no longer form a barrier to the universal introduction and use of our improvements in the most distant localities. By having the lumber dressed with a planer and cut up with a small circular saw, more than one-half the labor is saved, yet we pay a price equal to hand labor to guard against competition between different factories, which would lessen instead of increase the number of places of manufacture, and thus defeat

* NOTE.—Paste-board card, lettered, to cut out with a penknife, by mail, 10 cents.

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the object we have in view. We still desire to correspond with factory men, and offer, besides the orders furnished, the territory in the vicinity at a reasonable price, and the *general agency* of the whole region. Any common soft wood lumber, if seasoned, will do for hives, and boards of almost any width will cut up without waste. No matching or extra work is required to make our ornamental hives, except the clouding. The shape and construction of the hive render it very attractive in appearance, which, combined with the many advantages gained, and its permanent success in the hands of the masses, is the secret of its general introduction into many of the best apiaries in every part of the land, and to some extent in other countries.

INSTRUCTIONS TO AGENTS AND OWNERS OF TERRITORY.

We insert this article for the benefit of many of our correspondents, who write to us to learn the best manner of engaging in the culture of the honey-bee, and of introducing improvements into any community. To save writing a great many letters, we will give directions, which, if carefully followed, will enable the beginner to commence bee-keeping as a business, with the least outlay of capital, and the most certain and speedy return of profit.

An inexperienced person is usually most successful, when he prepares the way by sending every bee-keeper in the region a circular, with his address written upon it, as Agent or Owner, as the case may be, that purchasers may know where to apply for books, rights, hives, &c. County fairs, elections, public sales,

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and other gatherings, afford excellent opportunities for selling books or distributing circulars to bee-keepers. A sample hive should be kept for exhibition, and our large ornamental advertising cards, (containing Agent's address,) should be hung up in post-offices, stores or other places of public resort, which never fail to excite a desire to see the hive, and many sales can thus be made with little effort or loss of time, and scarcely interfere with any other business. We also employ Agents to sell township rights in new or distant parts of the country.

Being duly and truly prepared, by purchasing outfit, &c., and withal a worthy citizen and well qualified in the knowledge of practical bee culture, you will easily convince men:

1st. That bee-keeping is profitable.

2d. That the hive is worthy of adoption.

3d. That selling books, rights, hives, and Italian queens, is highly remunerative, and that any one of these four kinds of business is good alone, and yet so connected that each aids the other.

The Agent will thus find plenty of purchasers, as in many instances several persons will join together in the purchase of their township, when it will cost each one no more than to purchase a single farm right. An agent should not sell the township in which he lives, or those adjoining, as the sale of a few farm rights will amount to as much as they would bring; besides, the territory is convenient for selling farm rights and hives in, and stocks of bees in such hives (with farm right) after you get as many as you wish to keep. We can furnish deeds printed expressly for owners of territory, as per price list.

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SALE OF BOOKS.

Good wages may be made selling books alone, especially if well equipped at County or State fairs. Take two hives, keeping the cap on one, and using the other for exhibiting the interior. Take also an observation hive, which should contain a frame of honey with an Italian queen, and enough workers to keep her warm.

Locate near the gang-way, and calling attention to the Italian queen, induce the people to purchase many books by selling them five or ten cents below the retail price, while upon the fair grounds. Books may also be sold at bookstores, at wholesale prices, or left on commission, hanging up the ornamental hand-bill to call attention to them. These will awaken the people to the importance of bee-keeping, when properly conducted, and prepare the way for a still greater sale of books in connection with rights and hives, when the people will not complain of properly rewarding those who have been the means of teaching them to successfully keep a profitable kind of stock, which supplies itself and its owner with delicious fare without injuring the pasture, or requiring a fence to protect the crops or prevent its straying away. As the book is cheap, and adapted to common hives, nearly all who have bees will purchase a copy, and will afterwards want better hives.

MAKING HIVES DURING WINTER.

By making a large supply of hives during winter, a great many rights may be sold, and perhaps a few bees obtained, by

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leaving a hive with each bee-keeper before swarming, on condition that you will pay him for one of his first swarms, should he hive one in it and afterward not wish to pay for farm right and hive. A great number of hives can be speedily distributed in this way, besides making many sales at the time. An empty hive will seldom be found after swarming is over, and should any one obtain bees from this way to replenish his apiary, he will be more fortunate than ourselves.

By transferring the bees and combs from common hives, the business may be continued until buckwheat and other late flowers commence blossoming. Some may be slow to purchase after the swarming season is past, but more stocks can be transferred in a day if near together, hence, it is better to humor such a person by a conditional guaranty of satisfaction. Purchase one of his stocks (at a fair price) on condition that he can retain it by paying your regular price, if he should choose to do so. Select a heavy populous stock, with broad sheets of comb, (page 80,) and transfer it into the movable-comb hive. (Page 89.) If early in the season, you will often leave out enough honey to pay for the stock, (page 91,) besides leaving plenty for the bees and brood

Seeing the bees so easily subdued (pages 35, 92) and safely transferred, any bee-keepers who may be present will usually purchase, and the owner will seldom fail to relieve you of your guaranty by paying you off. But even, should he not, the stock may be left until the boxes are filled with honey, when the veriest old fogy will yield his prejudice to self-interest. Do not neglect to deliver a deed of individual right to each purchaser.

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but in time the territory be sold and (as in case of neglect) pay ge exacted a second time.

ESTABLISHING AN APIARY.

The first thing that should be done, is to commence keeping bees in proper hives. Fit up an apiary tastefully, (page 83,) and stock it (page 86) gradually, that you may acquire knowledge by practice, in connection with the study of books, as your responsibilities increase. If the apiary be located near a public road, and dotted with hives of different colors, more sales will be made, and its owner will soon become widely known as a practical apiarian. An observation hive, with glass sides, and containing but one comb, is convenient for experiments, and will prove an attractive source of pleasure and instruction. It should be two inches between the glass and darkened with shutters on the outside. In this the queen may be seen depositing eggs during the working season. By Italianizing your bees as soon as possible, and all in your neighborhood, you will be prepared to rear queens and Italianize stocks throughout the region, which, aside from the profits of the apiary, will yield a handsome return, and may be carried on in connection with selling rights and hives. The Italian bees will attract a great number of visitors, who will become interested and purchase books, rights and hives. Having established an apiary and secured the territory in which he lives, it is worth more to the owner than to any one else, and should not be parted with unless he wishes to start again in another county, but the profits of the apiary are usually too great to justify a removal.

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PRICE OF TOWNSHIP RIGHTS.

We prefer to sell township rights, rather than large tracts of territory, where the hive is being introduced, as many sales of whole States would terminate extensive advertising by us, which is a great aid to agents and owners of territory. In some instances we have received for farm rights sold several times, the original price of a township, when some person becoming convinced that a great number of rights and hives could be sold yearly, (by first supplying bee-keepers, and thus stimulating those who have no bees to buy them,) applies to us or to the agent for the purchase of his township, and is surprised that we make no deduction from our regular price. To all such, we would say that the value of a township is increased, rather than diminished, by the general use of the hive.

Our price for the right of a township containing less than 150 voters, is	$30 00
Between 150 and 200 voters, is	35 00
Between 200 and 300 voters, is	40 00
Between 300 and 500 voters, is	45 00

If the number of voters in your township is not known, see the last census report, or ask any Justice, trustee or politician, and ascertain the price from the above table.

CLUBBING WITH OTHER PAPERS.

We will send any one of the following periodicals with *The Bee-Keeper's Journal and National Agriculturist*, for one year, as follows:

Rural New Yorker ($3) and Bee-Keeper's Journal,	$3.25
Scientific American ($3) and Bee-Keeper's Journal,	3.50
American Agriculturist ($1.50) and Bee-Keeper's Journal,	2.00
Harper's Magazine ($4) and Bee-Keeper's Journal,	4.25
Phrenological Journal ($3) and Bee-Keeper's Journal,	3.25
Lippincott's Magazine ($4) and Bee-Keeper's Journal,	4.25
Peterson's Magazine ($2) and Bee-Keeper's Journal,	2.50
New York Weekly Tribune ($2) and Bee-Keeper's Journal,	2.50
Prairie Farmer ($2) and Bee-Keeper's Journal,	2.50
Christian Union ($2.50) and Bee-Keeper's Journal,	2.75
Manufacturer and Builder ($1.50) and Bee-Keeper's Journal,	2.00
Nasby's Toledo Blade ($2) and Bee-Keeper's Journal,	2.25
The Christian ($0.60) and Bee-Keeper's Journal,	1.40

To secure any of the above, orders and money must be sent to H. A. KING & CO., N. York.

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TESTIMONIALS OF OUR BUSINESS

Before our removal from Nevada, O., to New York.

MAYOR'S OFFICE, NEVADA, O., Sept. 14, 1866.

To those unacquainted with the firm of H. A. King & Co., this is to certify that the members of said firm are men of unquestionable integrity, and in their positions of usefulness are much esteemed in this community. J. S. LEITH, Mayor.

This may certify that the firm of H. A. King & Co. have a large correspondence throughout the United States, which, with their sales of books, embrace almost one-third the business of this office. L. NICHOLS,
Postmaster at Nevada, Ohio.

From J. Kisor, Esq., County Commissioner, Nevada, Ohio.

The home sales of the American Bee-Hive are very large, and yearly increasing, the Hive being generally used in this whole region. J. KISOR.

OFFICE OF THE AMERICAN EXPRESS CO., NEVADA, O.

The shipments of Hives, Italian Bees, Books, &c., by H. A. King & Co., constitute more than one-third the business of this office, aside from their quantity shipments by freight, G. W. MAXFIELD, Agent.

M. L. Dunlap, of Illinois, a distinguished Apiarian, Editor "Illinois Farmer," Rural Tribune correspondent, and member American Pomological Society, wrote in 1864: "We have given 'The Bee-Keeper's Text-Book' a careful perusal, and are highly pleased with it. The ideas on wintering bees are very valuable, and must be of great use to us on the prairies."

In 1865, in the Chicago "Tribune," he says: "Let every bee-keeper buy some standard work on bees, such as Langstroth's, King's, or Quinby's, to aid him, and leave quackery to die a natural death."

In 1866 he writes: "We find 'The Bee-keeper's Text-Book' the most valuable of all the late works on bee culture."

From J. Harris, Editor Genesee Farmer.

I have read your work on bees, and like it very much indeed. I got more information from it than from any other work I ever read.

NOTE.—The improved closed-top movable frames, were secured to us by Letters Patent, October 10, 1865, (page 131,) but to more perfectly secure it and other late improvements, (the "worker comb-guide," etc., page 48,) we applied for our third patent, which issued September 8, 1868, with the following claims: "1. The slots Z, in connection with a double tier of honey-boxes with comb foundations, as specified, and for the purposes set forth. 2. Constructing the close-fitting top bars, O, with comb-guides, U, and slots, as specified, and for the purposes set forth."

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THE HARRISON BEE-FEEDER.

THIS Feeder, now deservedly so popular, consists of a tin cup, with an open elevated bottom, for setting over the openings in the frames, or over a hole in the top of a bee-hive, where the bees can get at the feed at all times, even in the coldest weather. The liquid feed is kept in place by a cotton strainer, just above the bottom of the cup, and can only escape as the bees lick it off; hence an exchange says: "This seems to be a very complete 'bee-lick,' and its use must save many a lightly stocked hive of bees from starvation during winter." The feed is poured in at the top, without moving the feeder or disturbing the bees, and the closely fitting cover is replaced, which completely excludes all robber bees.

We have purchased this valuable patent of Mr. Harrison. It is recommended by all the leading apiarians in the United States, both for convenience and utility.

I like it much.—*M. Quinby.*

Its use must save many a lightly stocked hive of bees from starvation during winter.—*Ohio Farmer.*

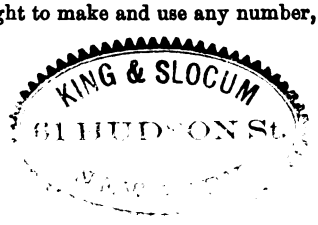
I think nothing could be more perfect for the purpose for which it is designed.—*Mrs. E. S. Tupper.*

I have given it a thorough trial, and find it an admirable contrivance for feeding bees in summer or winter. I would not be without it for many times its cost.—*Col. Jos. Leffel.*

It obviates the great difficulty which many find when feeding, of attracting robbers, as it can be placed over any hive so as to absolutely prevent this.—*Prairie Farmer.*

One sample feeder sent by mail for 75 cents, or two for $1.00; per half dozen, by express, $2.50; or, per dozen, $4.00. Individual right to make and use any number, $2.00. Address,

H. A. KING & CO.,
New York.



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Removal and Consolidation.

The National Agriculturist, of Pittsburgh, Pennsylvania, and *The Bee-Keeper's Journal*, of Cleveland and Nevada, Ohio, have been consolidated, and removed to New York. Our Journal not only reaches the readers of the two papers, but the circulation has rapidly increased since our removal. The two journals in one is now a large, illustrated, forty column paper, containing five Departments, viz.: Bee-Keeping, Agriculture, Home and Fireside, Ladies' and Youths' Departments, making it the cheapest and best family paper in America, for only $1 a year. Edited by Homer A. King and Ellen S. Tupper, and published by H. A. King & Co., New York; one sample copy sent free.

LIBERAL OFFERS.

TWO PORTRAITS, OR A BOOK, FREE FOR EVERY SUBSCRIBER!

In order to induce old and young, men and women everywhere to join in a Club, we authorize our Agents to promise *every* subscriber in every club of ten or more, the *choice* of *one* copy of the Tenth Edition of *The Bee-Keeper's Text-Book*, in paper covers; *or* two Portraits of Eminent Bee-Keepers, on cardboard for framing.

These offers will greatly assist our Agents, and, as they will not affect the Cash or Premium offers, we shall look for stirring times and thousands of new subscribers soon.

OUR NEW PREMIUM LIST.

To every person soliciting subscribers for *The Bee-Keeper's Journal and National Agriculturist*, who prefers Premiums rather than retain 25 per cent. cash on clubs of Five or more subscribers, we make the following liberal offers on conditions that one-half or more of each club formed are new subscribers, and that we receive $1 for each subscriber.

1st.—American Watches.

We will give a genuine American Waltham Watch, *Bartlett movement*, three ounce hunting case, warranted coin silver, for Seventy-five Subscribers, ...$75.00
Or Twenty-five Subscribers and $20 extra,..... 45.00
Or Fifteen Subscribers and $25 extra,..... 40.00

2d.—Honey Extractor.

We will give one new Honey Extractor, for Forty-five Subscribers,.....$45.00
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3d.—Arion Piano-Forte.

One Arion Piano-Forte, worth $600, for Three Hundred Subscribers and $300 extra,.....$600.00
Or one Hundred Subscribers and $350 extra,.....$450.00

4th.—Movable-Comb Bee Hives.

One Hive and Right to make and use, worth $9, for Fifteen Subscribers,.....$15.00
Or same for Five Subscribers and $5 extra,..... 10.00
Or same with material for Five Hives ready to nail together, for Forty Subscribers,..... 40.00
Or same for Fifteen Subscribers and $10 extra,... ..... 25.00
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5th.—Italian Queens

We will ship, in the proper season, an Imported Italian Queen, with guaranty of safe arrival, for Subscribers,.....
Or same for Ten Subscribers and extra,.....
Or same for Five Subscribers and extra,.....

See Revised Premium List in last number of Bee-Keeper's Journal.

(Continued on 3d page of Cover.)

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(Continued from 2d page of Cover.)

OUR NEW PREMIUM LIST.

6th.—Home-Bred Queens.

We will ship a choice Italian Queen, purity and safe arrival guarantied, for Twelve Subscribers,..... $12.00
Or same for Five Subscribers and $3 extra,..... 8.00
Or same for Eight Subscribers and $2 extra,..... 10.00

7th.—The Bee-Keeper's Text-Book.

We will send by mail the Ninth Edition of *The Bee-Keeper's Text-Book*, neatly bound in red muslin, with gilt lettered back, for Two Subscribers,..... $2.00
Or same in paper covers for One Subscriber,..... 1.00

8th.—The Bee-Keeper's Journal and National Agriculturist

For one year, for Three Subscribers,..... $3.00

9th.—Microscopes.

We will send by mail a choice French or English Microscope, of high magnifying power for small objects, for Fifteen Subscribers,..... $15.00
Or same for Three Subscribers and $3 extra,..... 6.00

10th.—The Wilson Sewing Machine.

We will ship from Cleveland, Ohio, one Wilson Shuttle Sewing Machine, (lock stitch,) worth $40 cash, for Sixty Subscribers,..... $60.00
Or same with Italian queen, &c., for Twenty Subscribers and $20 extra,..... 40.00
Or same with Italian queen, &c., for Ten Subscribers and $30 extra,..... 40.00

11th.—Webster's Dictionary.

We will give Webster's Unabridged Dictionary, (latest edition, 3,000 engravings,) worth $12 cash, for Thirty-six Subscribers,..... $36.00
Or same for Ten Subscribers and $8 extra,..... 18.00
Or same for Five Subscribers and $9 extra,..... 14.00

12th.—Washing Machines.

We will ship the Doty Washing Machine, worth $14 cash, for Twenty-five Subscribers,..... $25.00
Or same for Ten Subscribers and $7 extra..... 17.00
Or same for Five Subscribers and $9 extra,..... 14.00

13th.—Clothes Wringers.

We will ship one Universal Clothes Wringer, large size, worth $10 cash, for Twenty Subscribers,..... $20.00
Or same for Ten Subscribers and $5 extra,..... 15.00

14th.—The Harrison Bee-Feeder.

We will send by mail one Harrison Bee-Feeder, for Three Subscribers,..... $3.00
Or Right to make and use, singly or per dozen, as per premium offers in price list of latest edition of Text-Book.

15th.—Alsike Clover Seed.

We will send ¼ pound by mail for Two Subscribers,..... $2.00
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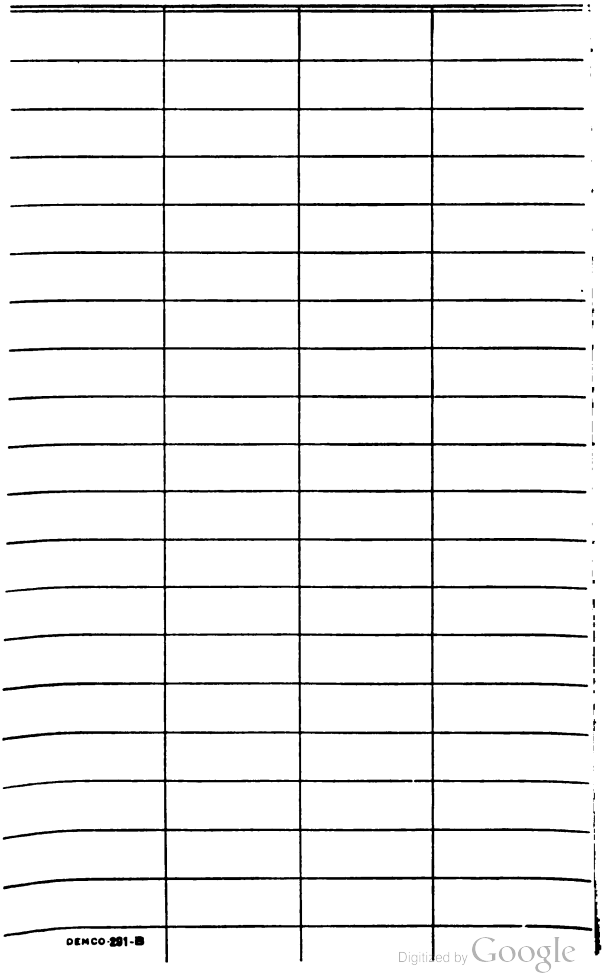

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